

# SUPPLEMENT.

# The Mining Journal,

## RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]

No. 2558.—Vol. LIV.

LONDON, SATURDAY, AUGUST 30, 1884.

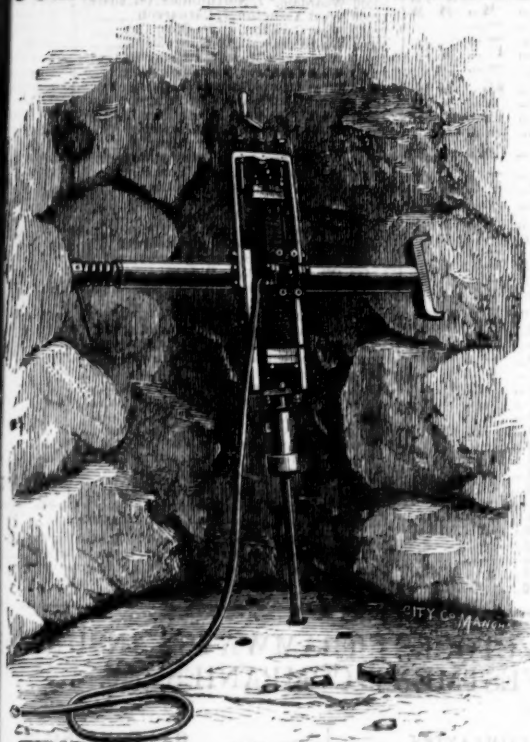
PRICE (WITH THE JOURNAL) SIXPENCE  
BY POST £1 4s. PER ANNUM.

FIRST SILVER MEDAL, ROYAL CORNWALL POLYTECHNIC  
—Highest Award for Effectiveness in Boring, and Economy in  
the Consumption of Air.

JUBILEE EXHIBITION, 1882.

THE PATENT

"CORNISH" ROCK DRILL.



FIRST SILVER MEDAL AWARDED AT BORING COMPETITION, DOLCOATH MINE, 1881.

The "CORNISH" ROCK DRILL and "CORNISH" COMPRESSOR

are now largely in use, and in every case are giving entire satisfaction.

For Testimonials, Illustrated Catalogues and prices, apply to—

HOLMAN BROTHERS,  
CAMBORNE FOUNDRY,

MAKERS OF

MICHELL & TREGONING'S PATENT PULVERISER, and HOLMAN'S IMPROVED STEAM or AIR PUMPING and WINDING ENGINE for Underground Quarries or Shallow Mining. Indispensable for Shaft Sinking with Rock Drills. Also makers of all kinds of MINING MACHINERY at

THE CAMBORNE FOUNDRY AND ENGINE WORKS, CAMBORNE, CORNWALL.

ROCK DRILLS  
FOR  
HAND AND POWER.



DUNCAN BROS.,  
32, QUEEN VICTORIA STREET,  
LONDON, E.C.

PATENT  
"INGERSOLL ROCK DRILL."

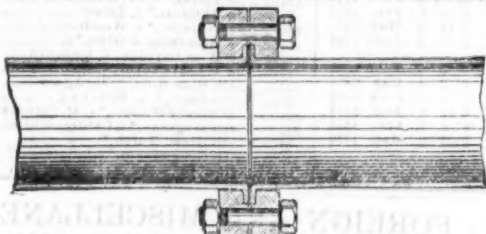
MEDAL  
AND  
HIGHEST  
AWARDS.

1872—American Institute.  
1873—Ditto.  
1874—London International.  
1875—Manchester.  
1875—Leeds.  
1875—Cornwall.  
1875—Rio de Janeiro.  
1876—Australia.  
1876—Philadelphia.  
1877—Cornwall.  
1877—Mining Institute.  
1878—Paris.



We claim 40 per cent. greater effective drilling power.

WROUGHT-IRON STEAM TUBES.



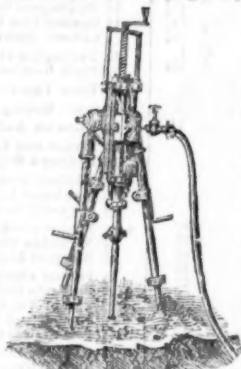
TUBES FOR BOILERS, PERKINS'S, and other HOT-WATER SYSTEMS.

For Catalogues of Rock Drills, Air Compressors, Steel or Iron Steam Tubing, Boiler Tubes, Perkins's Tubes, Pneumatic Tubes, and all kinds of Machinery and MINING PLANT, apply to—

LE GROS, MAYNE, LEAVER & CO.  
60, Queen Victoria Street, London, E.C.

THE PATENT  
"ECLIPSE" ROCK-DRILL  
AND  
"RELIANCE" AIR-COMPRESSOR.

SILVER MEDAL—PARIS, 1878—  
HIGHEST AWARD



Are NOW SUPPLIED to the  
ENGLISH, FOREIGN, and  
COLONIAL GOVERN-  
MENTS, and are also IN USE  
in a number of the largest  
MINES, RAILWAYS, QUAR-  
RIES, and HARBOUR  
WORKS in GREAT BRITAIN  
and ABROAD.

FOR ILLUSTRATED CATALOGUE AND PRICES, apply to—  
HATHORN & CO., 23, Charing Cross, London, S.W.

S. MASON and Co.,  
STONE MACHINE WORKS, LEICESTER.

New Patent Simplex Stone Breaker.

Patented June, 1884.

This Machine only has five wearing parts; others have 26.

LARGE SIZES.

Can be worked by hand or cattle Power.

IT HAS 24 ADVANTAGES OVER ALL OTHERS.  
SEND FOR LISTS OF OUR OTHER PATENTS; ALSO  
RECENT TESTIMONIALS

DENT'S  
WATCHES  
AND  
CLOCKS.

NEW ILLUSTRATED CATALOGUE of  
HIGH-CLASS WATCHES and CLOCKS at  
REDUCED PRICES sent Post Free on ap-  
plication to E. DENT and CO., Makers to  
the Queen, 61, STRAND, LONDON, W.C.;  
or 35, ROYAL EXCHANGE, E.C.

AIR COMPRESSORS,

With R. SCHRAM'S  
Patent

Inlet and Outlet Valves.

BOILERS, TURBINES.

SCHRAM'S IMPROVED

ROCK DRILL.

1600 in Use in all Parts of the World.

Complete Rock Boring Plants of the most  
approved construction for Railway Tunnels,  
Quarries, Shaft Sinking, Level Driving,  
Stoping, and Submarine Blasting.

All Kinds of Mining Machinery.

ESTIMATES AND FULL PARTICULARS ON APPLICATION.

RICHARD SCHRAM & CO.,

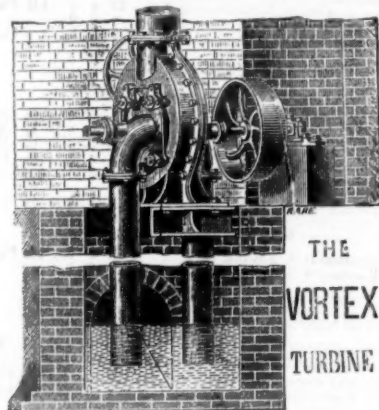
9, NORTHUMBERLAND STREET, CHARING CROSS,  
LONDON.

GILBERT GILKES & CO.,

KENDAL, ENGLAND,

LATE

WILLIAMSON BROS.



A most efficient means of applying Water Power to all kinds of Machinery.

Largely used in DRIVING AIR COMPRESSORS, PUMPING,  
WORKING ORE-CRUSHING MACHINERY, and for other pur-  
poses in connection with MINING.

Successfully used in ELECTRIC LIGHTING, and in utilising  
DISTANT WATER POWER by means of ELECTRICITY.

A Pamphlet containing a full description of the Vortex, with e-  
veral Illustrations and a number of Testimonials, can be obtained on  
application.

STEPHEN DAVISON,

TIMBER AND MINING STORES MERCHANT,  
MORPETH.

Chocks, Sleepers, Shafts, Helves, Spokes, Naves, Felloes, Pit Props,  
Mining Timber, Tub-wood, Wagon-wood, &c., supplied at  
Market Value.

MINES BOUGHT. COMPANIES FORMED ON EQUITABLE  
TERMS.

MORDEY, CARNEY, AND CO. (LIMITED),  
SHIPBUILDERS, AND MARINE AND GENERAL

ENGINEERING WORKS,

DRY DOCKS, NEWPORT, MON.

All kinds of WROUGHT and CAST IRON STRUCTURAL WORK,  
including Girders, Tanks, Boilers, Colliery Plant, Winding Engines,  
Iron Coal Wagons, heavy Smith Forgings, Dock Gates and Caisons,  
and requirements of Harbour and Dock Works, &c., &c.

All Orders executed promptly, and Tenders from Plans  
and Specifications.

THE IRON AND COAL TRADES REVIEW  
The IRON AND COAL TRADES REVIEW is extensively circulated amongst the  
Iron Producers, Manufacturers, and Consumers, Coalowners, &c., in all the iron  
and coal districts. It is, therefore, one of the leading organs for advertising every  
description of Iron Manufacture, Machinery, New Inventions, and all matters  
relating to the Iron Coal, Hardware, Engineering, and Metal Trades in general.  
Office of the Review: 342, Strand, W.C.  
Remittances payable to W. T. Pringle.



# BELL'S ASBESTOS.

**BELL'S PATENT ASBESTOS BLOCK PACKING for High-Pressure Engines.**  
The following testimonials refer to this Packing—

**Mania Lodge, Amlwch, Anglesey.**  
2nd August, 1884.  
DEAR SIR,—I have much pleasure in answering your note. Bad times in mining have compelled me to try all kinds of expedients in order to effect saving; some have succeeded and some have failed, but my underground manager, Capt. Hughes, has just said to me by the telephone—“The Asbestos Packing is the best thing ever brought here.”  
It saves money and trouble, but like my gas purifying oxide it lasts so long that you must not expect another order from me for twelve months at least.  
Yours truly,  
T. P. EVANS,  
Late H.M. Inspector of Metalliferous Mines.  
Mr. J. Bell, Manchester, Sheffield, and Lincolnshire Railway—Steamship Department, Grimsby, April 10th, 1884.

DEAR SIR,—I have much pleasure in stating that after a trial of over nine months, and comparing it with other packings, I can confidently recommend your Asbestos Packing. It is especially valuable when high-pressures are employed, as in cases where other packings have perished, owing to high temperatures, your packing has invariably stood well. I have also used it with complete success when a gland has heated with other packings, and also in cases of badly scored piston rods. I consider the results I have obtained by its use for our marine engines to have been in every way highly satisfactory.  
Yours truly,  
G. H. CLARKE, Sup. Engineer.  
Mr. J. Bell, Department of the Director of Navy Contracts, Admiralty, Whitehall, 20th June, 1884.

SIR,—I have to inform you that your tender has been accepted for Bell's Boiled Cloth Asbestos Packing to sample submitted:—Elastic core ... Square.  
JOHN COLLETT, Director of Navy Contracts, Admiralty, Whitehall, 20th June, 1884.

To Mr. John Bell.  
The Patent Block Packing is square, as Fig. 1 and Fig. 2 and 3 represent the Round Block Packing with solid and hollow rubber core, and Fig. 4 without core, but with rubber inlaid. As these packings are extensively imitated, and as it is a common practice among dealers and agents to supply the cheaper manufactures at my list prices, users are requested to see that the packing supplied to them bears the trade mark.

**BELL'S ASBESTOS BOILER PRESERVATIVE.**—This useful mixture by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that  $\frac{1}{4}$  in. thick of incrustation causes a waste of 15 per cent. of coal;  $\frac{1}{2}$  in., 50 per cent.;  $\frac{3}{4}$  in., 150 per cent. Thus the Preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler, and covers its own cost a hundred-fold by economy of fuel. It is entirely harmless, and has no injurious action on metals. It can be put into the feed tank or boiler, as may be most convenient. Sold in drums and casks bearing the Trade Mark, without which none is genuine.

**BELL'S ASBESTOS YARN and SOAPSTONE PACKING** for Locomotives and all Stationary Engines running at very high speed with intense friction.  
Sandwell Park Colliery, Smethwick, 1st February, 1884.

To Bell's Asbestos Works.  
DEAR SIR,—I have much pleasure in stating that I have used your Asbestos Packing for the last 12 months for our large winding engines which are running night and day, and also for the fan, pumping, and hauling engines at the above Colliery, and during that period we have not used more than one-third the Packing we had formerly; and this I attribute to your Packing on account of its great durability and general excellence of quality.—I am, dear Sirs, yours faithfully,  
THOMAS WINTER, Colliery Engineer.



**BELL'S ASBESTOS.**  
The goods of this house are of the highest quality only, and no attempt is made to compete with other manufacturers by the supply of inferior materials at low prices. All "home" orders should be sent direct to the undermentioned depots and not through Agents or Factors.



FIG. 1.

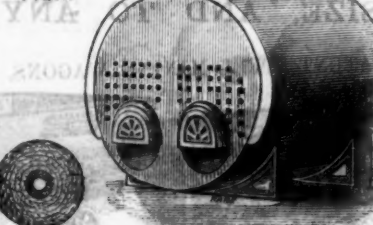


FIG. 2.



FIG. 3.

**BELL'S ASBESTOS BOILER AND PIPE COVERING COMPOSITION.**  
Coating every class of steam pipes and boilers, non-combustible and easily applied with a brush, is up to date; adheres to metals and preserves them from rust; prevents the unequal expansion and contraction of boilers exposed to weather; covers 50 per cent. more surface than any other covering and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 25 per cent. of fresh, and applied again. The composition is supplied dry, and is only to be mixed with water to the consistency required for use.

A Horizontal Boiler, 17 ft. 6 in. long, 15-H.P., gave the following results:—  
Temperature on Plates - 180 deg.  
Covering - 94 deg.

One ton of coal was saved per week, and although the fire was raked out every evening 20 lbs. of steam were found in the boiler next morning.

The following Testimonials refer to this Covering:—  
DEAR SIR,—It may interest you to know that we have exactly 45 per cent. in fuel through using your covering.

Office of the Wimbledon Local Board, Wimbledon, Nov. 28th, 1883.  
Yours truly, W. SANTO CRIMP, C.E., F.G.S.

The Tamar and Kit Hill Granite Company (Limited),  
Gunnislake, Tavistock, 8th April, 1884.

DEAR SIR,—I have much pleasure in stating that the Asbestos covering applied by you to the boiler of our travelling crane at Kit Hill has yielded most remarkable results. Since it has been in use we have saved fully half our coal, and have effected a great saving in the time it takes to get the high gantries, and is fully exposed to all weather. I have formed the highest opinion of your Asbestos as used for this purpose, and as you are aware, have had another boiler similarly covered, though it has not since been used. I can most strongly recommend the material.

I am, Sir, yours faithfully,  
W. J. CHALK, Assoc. M. Inst. C.E., Engineer and Manager.  
**BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE SHEETING**, for making every class of Steam and Water Joints. It can be bent by hand to the form required without puckering, and is especially useful in making joints of manhole and mudhole doors. It is kept in stock in rolls of 100 ft., from  $\frac{1}{4}$  in. to 3 in. wide, and any thickness from  $\frac{1}{16}$  in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary. The same material is made up into sheets about 40 in. square, and each sheet bears the Trade Mark, without which none is genuine. It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with these inferior articles at my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears the Trade Mark.

**BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD**, for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1-64th in. to 1 in., and  $\frac{1}{4}$  millimetre to 25 millimetres thick. Each sheet bears the Trade Mark.

The following copy of acceptance of tender refers to above:—  
Department of the Director of Navy Contracts, Admiralty, Whitehall, S.W., 17th May, 1884.

SIR,—I have to inform you that your tender for Asbestos Millboard has been accepted.—Mr. John Bell.  
JOHN COLLETT, Director of Navy Contracts.

**BELL'S ASBESTOS EXPANSION SHEETING (PATENT).** This Sheeting is another combination of Asbestos with India-rubber, giving to the steam user the special advantages of both materials. The India-rubber Washer is protected from the action of heat and grease by an outer coating of vulcanized Asbestos Cloth, thus producing an excellent joint where expansion and contraction render other materials unserviceable. This material is admirably suited to steam pipe joints and every class of valve. Valves made of this material are very durable, as they are not subject to injury by oil.

## BELL'S "ASBESTOS LUBRICANT."

ILLUSTRATED PRICED CATALOGUE FREE ON APPLICATION TO

**BELL'S ASBESTOS WORKS, SOUTHWARK, LONDON, S. E.**  
OR THE DEPOTS—118a, SOUTHWARK STREET, S.E.,

Victoria Buildings, Deansgate, MANCHESTER.

11 and 13, St. Vincent Place, GLASGOW.

39, Mount Stuart Square, CARDIFF.

21, Ritter Strasse, BERLIN.

## R. S. NEWALL AND CO.,

Sole Patentees of Untwisted Wire Rope.

**Iron & Steel Ropes of the highest quality for Collieries, Railways, Suspension Bridges, &c.**

PATENT STEEL FLEXIBLE ROPES AND HAWSERS.

IRON STEEL, AND COPPER CORDS.

LIGHTNING CONDUCTORS.

COPPER CABLES of high Conductivity for Electric Light and Power.

London: 130, STRAND, W.C.

Liverpool: 7, NEW QUAY.

Glasgow: 68, ANDERSTON QUAY.

MANUFACTORY: GATESHEAD-ON-TYNE.

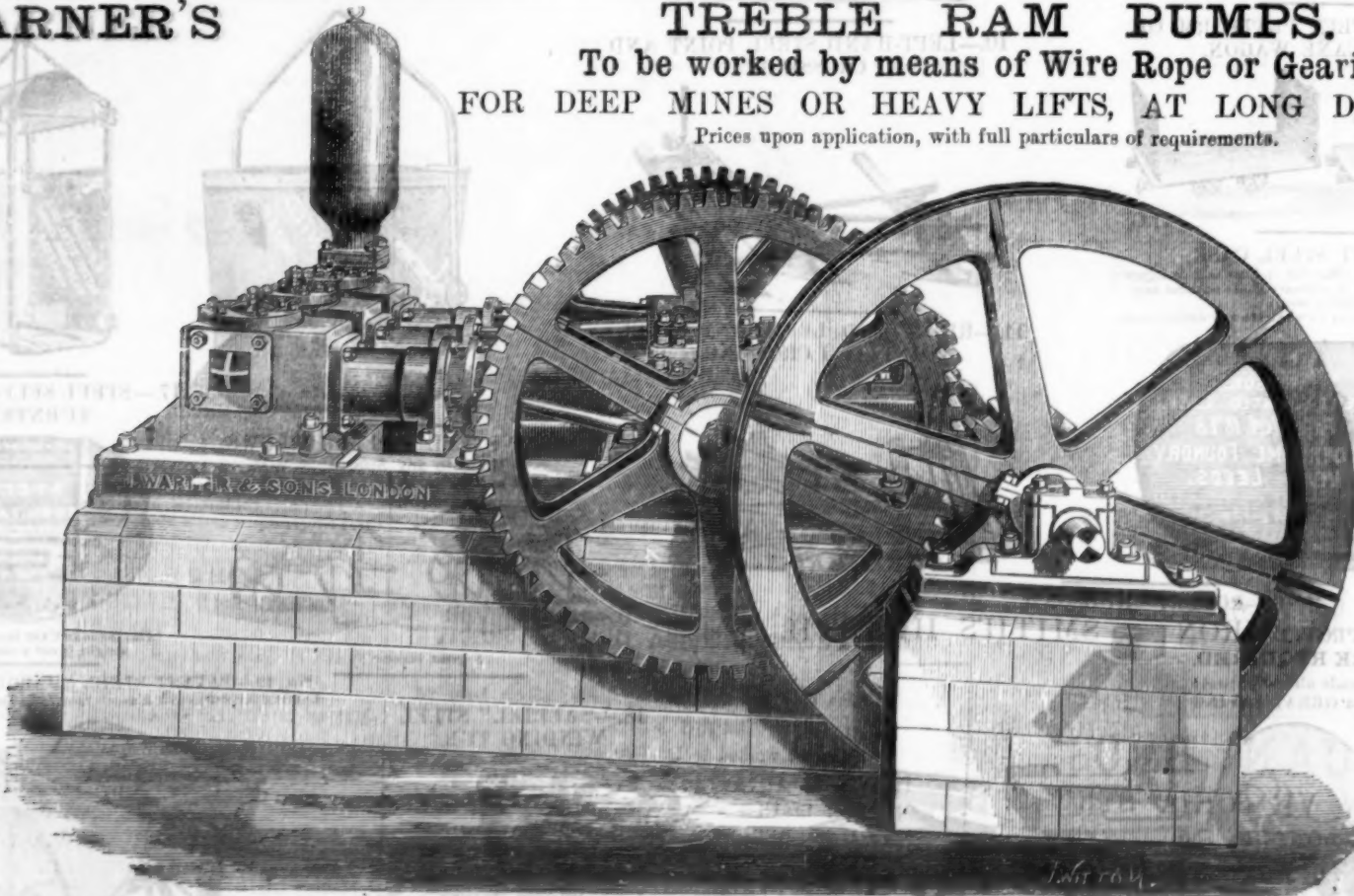
## WARNER'S

## TREBLE RAM PUMPS.

To be worked by means of Wire Rope or Gearing.

FOR DEEP MINES OR HEAVY LIFTS, AT LONG DISTANCES.

Prices upon application, with full particulars of requirements.



As supplied to Messrs BOWES, of Springwell Colliery, Gateshead, for a Lift of (600) Six hundred feet vertical through two miles of pipes.

**JOHN WARNER AND SONS, THE CRESCENT FOUNDRY, CRIPPLEGATE, LONDON, E.C.**



# R. HUDSON'S

## Patent Steel Trucks, Points and Crossings, PORTABLE RAILWAY, STEEL BUCKETS, &c., &c.

Telephone No. 14.

In connection with the Leeds Exchange, and all the principal Hotels and places of business in the town.

### GILDERSOME FOUNDRY, NEAR LEEDS.

(Near Gildersome Station, G.N.R. Main Line, Bradford to Wakefield and London, via Laisterdyke and Ardsley Junctions.)

Registered  
Telegraphic Address:-  
"GILDERSOME,  
LEEDS."  
A. B. C. Code used.

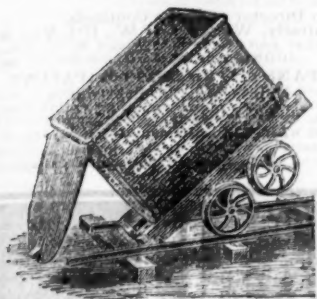
UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other Mines in this country, and are the **LIGHTEST, STRONGEST**, and most **CAPACIOUS** made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

Patented in Europe, America, Australia, India, and British South Africa, 1875, 1877, 1878, 1881, and 1883.

N.B.—The American, Australian, Indian, and Spanish Patents on Sale.

### CAN BE MADE TO ANY SIZE, AND TO ANY GAUGE OF RAILS.

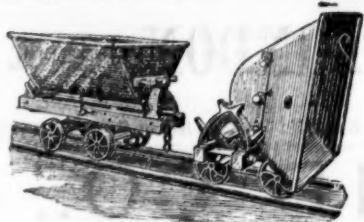
1.—PATENT STEEL END TIP WAGONS.



7.—PATENT STEEL MINING WAGONS.



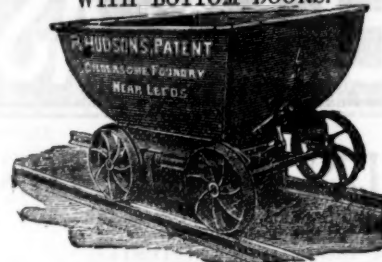
2.—PATENT UNIVERSAL TRIPLE-CENTRE STEEL TIPPING TRUCK, Will tip either side or either end of rails.



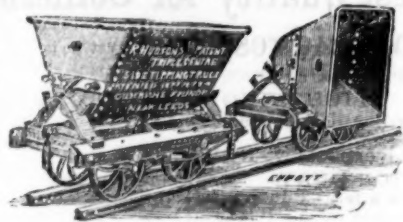
8.—PATENT DOUBLE-CENTRE STEEL SIDE TIP WAGONS, Will tip either side of Wagons.



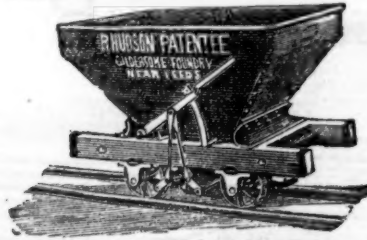
12.—PATENT STEEL HOPPER WAGON, WITH BOTTOM DOORS.



3.—PATENT TRIPLE-CENTRE STEEL SIDE TIP WAGONS.



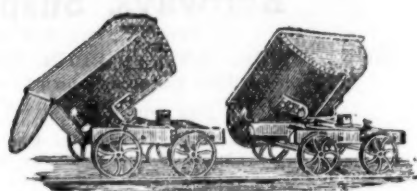
13.—PATENT STEEL HOPPER WAGON.



4.—PATENT STEEL PLATFORM OR SUGAR CANE WAGON.



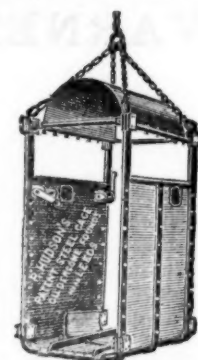
9.—PATENT STEEL ALL-ROUND TIP WAGON.



14.—SELF-RIGHTING STEEL TIP BUCKET. (The "CATCH" can also be made SELF ACTING if desired.)



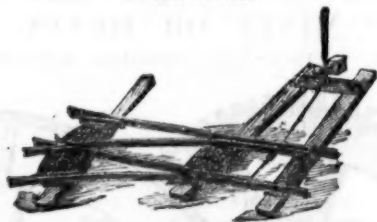
15.—STEEL CAGE.



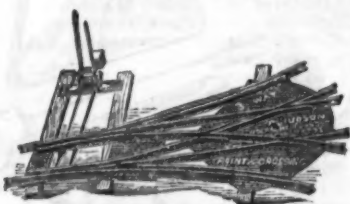
5.—PATENT STEEL CASK. As supplied to H.M. War Office for the late war in Egypt. DOUBLE the STRENGTH of ordinary Casks without any INCREASE in weight. (Made from 10 gals. capacity UPWARDS to any desired size.)



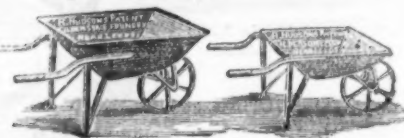
10.—LEFT-HAND STEEL POINT AND CROSSING.



11.—RIGHT AND LEFT-HAND STEEL POINT AND CROSSING.



16.—PATENT STEEL WHEELBARROWS. Made to any Size. Lightest and Strongest in the Market.



17.—STEEL SELF-CONTAINED TURNTABLE.



(Also made in CAST Iron for use where weight is not a consideration.)

18.—"AERIAL" STEEL WINDING TUB.



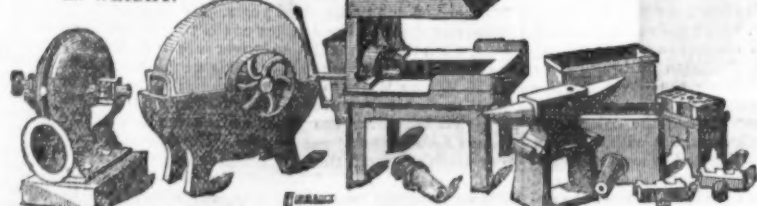
Largely employed in the South African Diamond Fields.

No. 19.—PATENT STEEL CHARGING BARROW, DOUBLE the STRENGTH & much LIGHTER than ordinary Barrow



6.—ROBERT HUDSON'S PATENT IMPROVED IRON SMITH'S HEARTH. NO BRICKWORK REQUIRED.

A Special quality made almost entirely in STEEL, effecting a GREAT SAVING IN WEIGHT.



Large numbers in use by all the principal Engineers in this country and abroad.

ALL KINDS OF BOLTS NUTS, AND RIVETS MADE TO ORDER ON THE PREMISES



Pumping Engines  
for  
Mines, Water Works,  
Sewage Works,  
and  
General Purposes.  
CATALOGUES ON

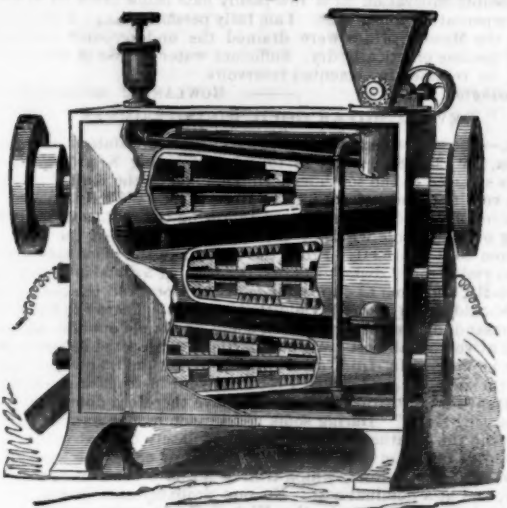
# PUMPING & MINING MACHINERY. HATHORN, DAVEY, & Co., LEEDS.

Hydraulic Pumps,  
Winding Engines,  
Air Compressors,  
Man Engines,  
Capstans,  
&c., &c.  
APPLICATION.

## NOVEL ELECTRO METALLURGICAL MACHINE.

PROFESSOR JAMES MANES AND SONS call the attention of miners, mineowners, capitalists, and others interested in the working of gold or silver mines to their new Electro Metallurgical Machine for extracting fine and rusty gold from sands or tailings of stamp mills, or the sands of hydraulic gold diggings, or from the black sands on the coast of Oregon or California, and other parts of the world where gold is found.

The problem that has long troubled the worker of free-milling gold and silver ores is a method to save the mineral now lost in the tailings of stamp mills or flumes. This alone, if it could be saved, would amount to many million dollars profit each year, besides enabling the working of much territory which is now lying idle for want of an economical and thorough process of treatment.



Prof. James Manes and Sons, of Denver, Colorado, U.S., have invented a machine (represented in the above engraving) which it is claimed will save nearly the entire amount of mineral which passes through it, the loss not being over 10 per cent., and in many cases not in excess of half that amount. The machine is a cheap and practical process—it never need stop for charging or cleaning up, being nearly self-acting. Steam, electricity, and mercury are used in the process of extracting the mineral.

This machine or amalgamator is adapted for free-milling gold or silver ores, or refractory after roasting. It consists of a series of three or more large cylinders, wider at one end than the other, placed one above the other in a horizontal position, a shaft or spindle running through the centre of each. The ore and mercury are fed into the first cylinder, passing into the second, and then to the third. The first cylinder is furnished with steel mullers which nearly touch the sides of the cylinder, and revolve at a good rate of speed, mixing the mercury and ore. The second cylinder is furnished with large steel brushes attached to the shaft or spindle, revolving at a high rate of speed; through this a current of electricity is furnished by a Westinghouse dynamo electric machine, which materially assists in gathering the particles of very fine gold together, and thoroughly amalgamating the metal and mercury. The third cylinder is similarly furnished to the second; into this the amalgam passes, and is again acted upon and mixed by the brushes to catch any gold which might have escaped amalgamation in the second. A fourth cylinder may be used if found necessary.

The amalgamated pulp then passes through a revolving copper drum, plated with quicksilver inside. As the drum revolves it takes up the most part of the amalgamated gold. As the inside of the drum is constantly washed with a spray of water from perforated pipes fixed inside of said drum, a clean-plated surface is constantly brought in contact with the pulp or tailings as it passes out from the cylinders. After leaving the drum it falls down on to incline copper plates, the same as is now used in stamp mills.

The amalgam can be collected from the drum and plates without stopping the machine, and any live quicksilver that passes will be caught in syphons. The tailings are carried off with the water. The machine when attached to the flume will be driven by the waste water; it sifts the fine sands from the coarse gravel, and amalgamates it as above.

The specific points claimed by Prof. Manes and Sons in their patent are—  
1.—The saving of almost all the mineral passing through the machine.  
2.—The loss being less than 10 per cent.  
3.—The entire absence of loss of the amalgamated material, thereby saving all the mercury, which, with the processes now in use, there is a large loss both of mercury and the precious metal.  
4.—The small cost per ton at which the ore can be treated.

By the addition of the powerful current of electricity that passes off the revolving brushes, the most minute particles of gold will be caught and retained, which in the ordinary flume and stamps passes off with the water; this often amounts to a large percentage.

The inventors state that if English stock companies will give their assistance to work the black sands of Oregon and California by paying for the building of the machines, they will take a share of the gold for their services, or they will send their machines to any part of the world, or will sell patent rights to those desiring any of their patent machines or revolving furnaces for roasting or smelting ores, ball pulverisers, &c.

Prof. James Manes and Sons are agents for the Morey and Sparey Ball Pulveriser, that crushes and pulverises at the same time, and does as much work as eight stamps in a day, crushing either wet or dry.

PRINCIPAL OFFICE OF

**Prof. MANES and SONS,**  
No. 372, Glanarm Street, Denver, Colorado,  
U.S.A.

All our machines and furnaces are made by the Colorado Iron Company of Denver, Colorado, the most extensive mining machine works in America.

**ALEXANDER SMITH, M.Inst.C.E., CONSULTING  
ENGINEER and VALUER of IRONWORKS,  
MINING, RAILWAY, ENGINEERING, and other PROPERTY,  
PLANT, and MACHINERY,  
PRIORY STREET, DUDLEY**

4, BURLINGTON CHAMBERS, NEW STREET, BIRMINGHAM.

Mr. SMITH has been retained for nearly 20 years by some of the most prominent firms, and has conducted many of the largest valuations that have taken place in the kingdom.

Valuations for Stock Taking or any other purpose upon very reasonable terms.

**PHILLIPS MONTHLY MACHINERY REGISTER.—  
THE BEST MEDIUM IN THE KINGDOM  
FOR THE  
PURCHASE OR SALE  
OF  
NEW OR SECONDHAND MACHINERY.**

Subscription, 4s. per annum, post free.

PUBLISHED AND PROPRIETOR,  
CHARLES D. PHILLIPS, NEWPORT MON.

## MINERAL RESOURCES OF NEW SOUTH WALES—No. IV.

**IRON.**—The Esbank Iron Company (the only makers of iron in the colony) made during the year iron to the value of 26,908l., which is considerably less than the value of the make for 1882. But in 1882 the company made pig-iron to the value of 15,120l., whereas in 1883 the blast-furnace was not in work. The number of men employed during the year was 175, but they were not fully employed. In view of the fact that tenders have been invited by the Government for the supply of 150,000 tons of steel rails, to be manufactured in the colony from New South Wales ore, it may be useful to give a list of the best known deposits of iron ore, together with the various analyses which have as yet been made.

For the manufacture of steel from pig-iron, smelted from hematite and magnetic iron ores (which are in general practically free from sulphur, phosphorus, and copper) the process most commonly used is known as the Bessemer process. Molten pig-iron is run into an egg-shaped wrought-iron vessel (known as a converter) with an open inclined neck at the top, and lined with about 10 in. of fire-brick and ganister. A blast of air (at a pressure of about 20 lbs. per square inch) is turned on through a number of tuyeres at the base of the converter, and allowed to bubble through the molten iron. The duration of the blast varies from 13 to 20 minutes. The combustion of the carbon in the pig-iron with the oxygen raises the temperature to such an extent that the contents of the converter become as fluid as water. The carbon and silicon are almost entirely burnt out during the conversion. When the "blow" is at an end, (shown by the diminishing of the flame which rises through the neck of the converter) the blast is turned off, and from 7 to 10 per cent. of melted spiegeleisen is added to the contents of the converter. The fluid steel is then transferred from the converter into a casting ladle, and thence into vertical ingot moulds. The converters are constructed of a size sufficient to treat from 2 to 10 tons of metal. The Bessemer process was, however, useless for the treatment of pig-iron containing phosphorus and sulphur, until Messrs. S. G. Thomas and P. C. Gilchrist patented their modification, which is now known as the basic process, and by which pig-iron containing comparatively high percentages of sulphur and phosphorus can be cheaply converted into steel of the best quality. The Thomas-Gilchrist invention consists in lining the Bessemer converter with a so-called basic substance, such as limestone or dolomite (instead of fire-brick), with the result that practically the whole of the objectionable impurities—sulphur and phosphorus—are removed in the form of slag. Late experiments have shown that bricks moulded from calcined limestone or dolomite (magnesian limestone) mixed with tar, form the best linings for the converters. The greatest difficulty in connection with the process is the rather rapid wear and tear of the lining, which has consequently to be somewhat frequently renewed. However, the immense advantage of being able to manufacture the best steel by this process from ores containing such impurities will at once commend itself.

The principal deposits of iron ore in New South Wales, which occur within or near to the coal fields, are situated at Lithgow, Wallerawang, Mount Edgecombe, Mount Clarence, Piper's Flat, Mount Lambie, and in the Blayney district, on the Great Western Railway; and in the Mittagong and Berrima districts, on the Great Southern Railway. It was in the latter district, at the Fitzroy Iron-works, that the first attempt was made in the colony to smelt iron, but the result was not successful, chiefly, it is thought, on account of the unsuitable coal used. The iron ore of the Mittagong district consists of brown hematite, which has been deposited from ferruginous springs, and forms irregular but extensive deposits. The deposits occupy an area of 37.4 acres, and occur in five different localities situated within a radius of 4½ miles from the old Fitzroy Smelting-works, near Mittagong. The deposit at Fitzroy occupies an area of 4.2 acres, and taking 25 ft. as the thickness of the ore in sight (a bore is said to have been put down 40 ft. without going through the ore), it contains 430,900 tons of ore, estimated to yield 179,949 tons of pig-iron. The other deposits contain 2,446,320 tons of ore, estimated to yield 848,845 tons of pig-iron, giving a total of 2,886,220 tons of ore, equal to 1,028,794 tons of pig-iron. This quantity would keep three furnaces going, each producing 15,000 tons of pig-iron annually, for nearly 23 years. In 1882 the make of pig-iron in the United Kingdom was 8,493,287 tons, there being 565 furnaces in blast at the end of the year, or equal to an average production of 15,032 tons of pig-iron by each blast-furnace. In 1865 each furnace averaged 7391 tons of pig-iron.

There are also good iron ores in the Goulburn district, which would be available for the smelting-works of the Mittagong and Berrima coal districts. Limestone is abundant at Marulan, and all are within easy distance of the Great Southern Railway. I have not been able to ascertain the quantity of rails used annually in this and the adjoining colonies; but I find the quantities imported into or purchased in this colony from 1874 to 1882 amount to about 180,000 tons, and the consumption is always increasing, so that there will doubtless be a large demand if they can be made in this colony at such a price as will enable them to compete successfully with imported rails. At Lithgow, Wallerawang, and Piper's Flat seams of clay-band iron (limonite), from 6 to 18 in. thick, occur in the coal measures which crop out nearly horizontally in the side of the hills. Near Piper's Flat and Mount Lambie dyke masses of brown hematite and magnetite of irregular thickness occur in the altered Devonian sandstones; their extent has not yet been proved. The magnetite is occasionally associated with a silicious ferruginous garnet rock.

Abundance of marble limestone occurs near Piper's Flat. The Hawkesbury sandstone formation about Mount Edgecombe and Mount Clarence is traversed by numerous small veins of brown hematite, and consequently, where the sandstone has been denuded, fragments of these veins have collected in considerable quantities in places, and there is little doubt that this ironstone will be of future value for the smelting-works at Lithgow. It is, however, variable in quality, for it sometimes contains a large percentage of silicious sand derived from the sandstone in which it occurs. In the vicinity of Lithgow there are extensive beds of clay-shale ironstone, interstratified with the lower beds of the Hawkesbury sandstone formation. Similar beds occur in the same geological position in the Illawarra district, and in other parts of the colony. The ore may be useful to work in connection with the richer ores from other localities.

A large proportion of the iron ore smelted at the Esbank Iron-works, Lithgow, is obtained from the Blayney district, where it occurs in large quantities in isolated masses, which are easily quarried. The ore consists of brown hematite and magnetite. In the Goulburn district, through which the Great Southern Railway passes, and in the Bathurst and Blayney districts on the Great Western Railway, extensive deposits of manganese and ferro-manganese ores and limestone occur. In numerous other parts of the colony rich deposits of iron and manganese ores are known, but with, perhaps, few exceptions, they are not so favourably situated as are the above-mentioned in proximity, or within ready access by rail to coal and limestone deposits. In the Coolah Valley (Mudgee district) the deposits of ironstone in close proximity to coal is said to be practically inexhaustible.

**ANTIMONY.**—The export of antimony for 1883, as compared with that of 1882, shows a very considerable decrease. The Warden reports that the Corangula Antimony Company, in the Hunter and

Macleay district, is now carrying on the works with vigour, and the manager (Mr. Becke) is satisfied the ore will prove rich, and the deposits extensive. The shaft is now down 134 ft. At a depth of 120 ft. a fine lode was cut in the west drive, the ore from which yields 73 per cent. of metal. There are six other shafts in the mine, varying from about 60 to 80 ft. The ore from these ranges from 50 to 70 per cent. There are also tunnels opened, in which the indications are satisfactory. The furnaces have been remodelled, and 6 tons of star antimony have been sent to Sydney. There are 6 tons of ore at grass. At Hillgrove, near Armidale, according to the Warden's report, the works have been retarded by the decline in the price of antimony in England. Only 16 tons of star and 8 tons of crude antimony have been exported by the Hillgrove Company during the year. At Brereton's Mine 250 tons of ore have been raised during the year, which was sold in Armidale at 7l. per ton. At Hargrave, from the same line of reef, has sent away about 50 tons of ore during the year. At Gara Falls Messrs. Moore and Co. raised 100 tons of ore during the year, but the work at the mine was delayed in consequence of a lawsuit. The geological surveyor, Mr. C. S. Wilkinson, who recently inspected the antimony lodes at Hillgrove, considers they extend to great depths, and they will be profitably worked for gold.

**BISMUTH.**—The quantity exported during the year is very small. The work done during the year by the Kingsgate and Glen Innes Company has been chiefly prospecting. No machinery has been erected, and the quantity of ore raised was not very great, though the geological surveyor who inspected the lodes during the year reports that the bismuth lodes at Kingsgate and at Hogue Creek, near Glen Innes, present encouraging indications of payable deposits of ore.

**DIAMONDS.**—There appears now to be a prospect of the diamond fields around Bingera being developed, and I trust diamonds will figure in my next report as an important addition to our mineral products. The scarcity of water appears to have seriously retarded operations in 1883, but it is reported that Messrs. Falk and Co. have commenced sinking for water on their mine with a view to saving the cost of carting the washdirt to the river, a distance of over three miles. It is stated that Messrs. Falk and Co. obtained 400 diamonds from about 100 loads of wash, 300 of them having been won in the days. The diamonds are small, but 60 or 70 sent to London were it is stated, pronounced first-class. This mine is being worked in face into the hill; the wash is 6 ft. in height, and increases as the works are extended. Messrs. Craddock and party have reached the wash by sinking at 40 and 80 ft. respectively; they have found a quantity of very small diamonds of good quality, but have been unable to wash in consequence of the scarcity of water. Small diamonds continue to be found also in the Cudgegong river, in the Mudgee district.

**SLATE.**—A large amount of preliminary work has been done by the Australian Slate Company in opening their slate quarry at Dagai, and preparing for the reception of extensive machinery which has been ordered from England. In addition to this the company has turned out 30,000 slates and 10,000 ft. of slabs. The operations will be conducted on a large scale as soon as the necessary machinery and appliances have arrived and been placed in position.

## INDIAN GOLD MINING—THE KOLAR GOLD FIELD.

The idea having been to a certain extent revived that the auriferous deposits of the Mysore district may even yet be made to return profits to British capitalists, the subjoined account, given by a Bangalore correspondent of the Madras Mail, will be interesting. The writer was at the Balaghat Gold Mine on July 26. They were, he says, washing up, after having crushed about 75 tons. The amalgam will not be ready for retorting until Tuesday. What they were getting, whilst we were there, came up to their expectations, and they expect a satisfactory out-turn. The reef continues to hold out, and does not lessen in width. It is not as rich as it was, and is now estimated at 1 oz. per ton. It is not, however, to be expected that they will always find the reef of equal richness. If the average turns out 1 oz., and they, every now and then, come upon rich runs, as they have done, it will be a very valuable mine. I met Mr. Plummer, of the Mysore Mine. They also are doing very well. They have had two wash-ups. The first was 120 tons at 12 cwt.; and the second for 85 tons, at 88 oz., which is very good. They expect to turn out 100 ozs. a month, which will just pay expenses. This, however, is only for the present, and as soon as they can open out the lode they will get up considerably more stone, and hope to crush at least 10 tons a day. Their reef is said to be 5½ ft. wide, which is very good indeed.

Strange to say, at 200 ft. below the surface, they have come across old native workings. This seems almost incredible. There can be no doubt that it is chiefly owing to all the various captains not having believed that the natives could have gone so deep that the failures on the Kolar field are due. It seems probable that down to 150 ft. and even 200 ft., every bit of stone worth crushing has been taken. It is, however, only in the Balaghat and Mysore Mines that the present miners have done anything more than scratch the surface. Money has been wasted in digging a number of shafts, 50 or 60 ft. deep, instead of taking an old native working, which is sure evidence of a reef, and going on sinking until stone below the old native works were reached. This is what will have to be done if the mines which have now been stopped are ever reactivated. The country rock is all primary formation, and Mr. Plummer and Mr. Bray both say that, in formations of this kind, the reef continues to a depth to which it is almost impossible to assign a limit. There must, however, be a point beyond which the native miners of old could not go. The wonder is how they could ever have gone as deep as they did, because they had no pumps, and their works were open.

Looking at the great extent of ground which seems to have been disturbed near old native workings, it may be assumed that they had lifts, like the common picotta, and lifted the water to the surface. This, of course, necessitated the taking out of every bit of stone, but the yield must have been very great to repay so much outlay. It is, however, by no means improbable that the labour employed was forced labour, or that of slaves. Perhaps it was made a sort of penal settlement.

There can, however, be no doubt that the mines have been relinquished many hundred years. My idea is that the old native states relinquished their mines at the time of the Mahomedan invasions, when they thought it no longer safe to work them, on account of the cupidity of the conquerors. This would make the relinquishment of the Mysore Mines to be about the end of the 16th or beginning of the 17th century. In reading the old native histories it is strange to find that whenever the Mahomedans made a first conquest they always found great stores of gold. Now, as each native State kept very much to itself, the probabilities are that the gold was found within the State. As, however, at a second conquest, or after the Mahomedans had taken possession, we do not read of the stores being renewed, the production must have been stopped. The numerous underground passages in different parts of this section of the country, which now form the subject of some impossible tradition, and which generally have a temple at one end, are I believe nothing more than old adits.



Original Correspondence.

VENEZUELAN MINES.

In last week's *Mining Journal* attention is again directed to the gold mines of the Yururi, and notably so to the Austin concessions Nos. 1 to 10, by Mr. Joseph Nelson, of London, in respect to the titles of the Nacupai Gold Mining Company to those properties. Mr. Nelson states that the original deeds of the properties are in England, but not in possession of the company that should hold them, or in the possession of General Guzman Blanco, late President of the United States of Venezuela. The latter statement I can believe. I do not propose to occupy your valuable space by speculations as to whether such documents are in the hands of third parties here or not, but as I have had a good deal to do with the titles and plans of the property, as superintendent of the works in the first instance for the Nouveau Monde Company, and afterwards for the Nacupai Company, in each instance said documents and plans being in my possession for months at a time, and leaving my possession for registration or other legal purposes, every case receiving receipt for them by number of pages of manuscript, I shall thank you to afford me space to trace those documents and plans from the time they came into my hands in March, 1881, to the time I handed them over to Señor Dr. Martinez, the legal adviser at Guasipati to the Nacupai Company. Preceding my remarks by stating that the documents carry the signature of Señor Juan Bantista Dalla Costa, as President of the State of Guayana, and the plans, that of Señor Carlos Siegert, as official surveyor, or Agrimensor Publico, and are the same documents and plans that were in the possession of the Orinoco Company, or their representatives in Venezuela. At the bankruptcy of that company the documents and plans became the property of the creditors in that country, and were taken charge of by the Court or tribunal at Ciudad Bolivar having jurisdiction in such matters in accordance with the Código Civil y de Comercio.

In 1881 the properties were sold by the tribunal and "Concurso Acreedores" to the Nouveau Monde Company, to whose representative the "document and plans" were then handed over, and whose hands they then passed into those of Señor Filario, the appointed solicitor to the Nouveau Monde Company. My arrival out in March 1881, I found that I had to defend the 9 concession from the pretensions of a certain claimant. Those documents and plans were made use of in such defence, and the claimant's pretensions were set aside by the Supreme Court of Guayana, notwithstanding that he had received State assistance and encouragement—a pretty good sign that there was force and vitality in those "plans and documents." At the termination of that suit they came into my possession, and were carried by myself to the district in which the concessions are situated, and possession of the properties taken in the name of the Nouveau Monde Company through the local courts, by virtue of those "documents and plans." Later on in the same year an edict was issued by General Vicente Barria, Inspector of Mines for the district, that the plans and titles of all the mines in exploitation must be sent into him for his official revision. That was done, and these "documents and plans" now bear his signature under his declaration to that effect. Owing to the failure of the Nouveau Monde Company to complete purchase, the creditors foreclosed, the titles and plans becoming again their property. Señor Merizo Palazzi, becoming the purchaser, took possession of them; and on his reselling the property to the Nacupai Mines Syndicate the "plans and documents" again came into my possession as old friends, on behalf of the syndicate. They were then registered in Ciudad Bolivar in November, 1882, and again registered at Guasipati in the last days of December of that year, or the first days of January, 1883, and did not leave my possession again until they passed into the hands of the solicitor to the Nacupai Company, Señor Martinez Mariz, for the purpose of again defending the Austin No. 9, from an attack by a neighbouring company; and, in compliance with a decree from Caracas that all titles and plans of mining properties must be submitted to the Minister of Fomento for "revalidation," or revision. This was done, and I have no doubt that the Nacupai Company still hold them, and, as a title of right, are no doubt quite satisfied with them.

The fact of the matter is that the Act of Sale of the property in 1881 is the real title. The recognition of the bankruptcy of the Orinoco Company by the tribunal legally constituted under the Código Civil y de Comercio, and the resale of the property to another party for the benefit of the creditors, is an admission of right and title of the first party, and its transmission to second parties, and was so recognised by the Supreme Court in 1881 by the ordering possession and dominion of concessions J. B. Austin, 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10, to be given to the Nouveau Monde. The present misfortune to two companies is without doubt caused by the contention as to the ownership of Austin No. 9.

How, therefore, General Vicente Barria could make such a report to the General Government at Caracas "that he did not find any document or plans in his archives relating to the Austin concession," is, to say the least, very peculiar, as he was very well aware that not only had he revised those "documents and plans" in 1881, but had them again in his possession in his official capacity, and that they stood entered in the books of the registrar's office at Guasipati in 1883. A peculiar significance attaches to the two State documents noted by Mr. Nelson, and they are worth the close attention of all interested in Venezuelan mines. I trust the above statement may be of interest to your general readers as well as to the parties interested.—Aug. 27. BICKFORD ANTHONY.

THE GOLD FIELDS OF NORWAY.

SIR,—Progress is but slow in these parts lately. Want of money and no want of faith by the claim holders is the principal reason that the work is not pushed on quicker. Gold was found in several new claims last month; they do not show so rich as that found in the first claim opened, but may improve on sinking. Several little companies have been started in some of the nearest towns, such as Stavanger and Birgen. If their liabilities are not under the limited principle, I am afraid their capital is very much so, judging from the way they work; but let us hope if they are slow they are sure, and not spending all their money in offices and expensive staff of over-paid officials, as some of our English companies do. Claim-holders are just beginning to find out that there is a difference between pieces of unworked ground, and a mine means some money spent thereon, and that it is better for many to pay the expenses of one mine than one individual to try to work many mines. Capital is always difficult to obtain in new gold fields, even though they are located in an old settled country like Norway; but if the first companies do not overburden their mines with an inflated nominal capital out of all proportion to the real work done, they will, I think, be able to show that gold mining is a sound investment for moderate capital in Norway as well as Australia, not that I make any comparison between the richness of those places, as I see many writers on India and the Transvaal are fond of comparing new places; but, alas, the time comes when their statements and prophecies must often remain in back numbers of the *Mining Journal* as everlasting reproaches against their judgment. Those who make such comparisons seldom know how many thousand ounces of gold has been taken out of a single ton of quartz in Victoria such as the first ton crushed on the Colombia Reef, Inglewood.

I hope our friend Mr. W. Nicholas, F.G.S., in his interesting description of the Victoria quartz reefs, will give us some accounts of the gold taken out of some of those small 24 ft. claims, such as King's claim, on old Sandy Creek. Tarnagula I think was the new name, and if he will be kind enough to give us the old name of claims as he has done with the New Chum. They are very interesting to many like myself who worked on these places in the days of their infancy, and have not been able to trace them under their new names and new companies and others, and the point that is important when he tells us reefs are worked continuously for seven miles. Did they get gold all along, or are these people in between the hills working on spec. for the stock market. This is not always an easy matter to find out; but it is very important to those like myself wishing to compare the future with the past.

In another month or six weeks I suppose we shall have the mill belonging to the Oscar Mining Company at work. It is a very fine piece of workmanship, and does great credit to all concerned in erecting it; everything about it is done in the most substantial way. These are the only claims as yet that have any capital to develop them; but I hope the time is not far distant when other places will be able to work night shifts, and give me a little more progress to report; but I suppose even these would be considered lively companies in China or some part of Mexico, where they do not work any more till they have spent the last money got out. It is a difficult thing to realise the discovery of gold in any old settled country like Norway; but after all Sir Roderick Murchison and other geologists have long since pointed out the probability of it from the fact of rocks here belonging to the Silurian formation in which the gold is found in many countries—quartz reefs lying on slate footwalls, with coarse gabbro hanging-walls over them dipping eastward very slightly, and running north-west and south-easterly strike; but some of them vary several points in the direction of their strike. The veins have been sunk on to a depth of 30 ft., in several places showing well-defined quartz ledges or reefs, and improving in richness as they go down. The Haugesund still continues to be the favourite ground, and receives great patronage from the hundreds of visitors who pay periodical calls by the steamers from the adjoining towns, and return very much disappointed if they do not get a specimen of gold quartz to take back with them. No arrangement has yet been come to with any capitalists, partly because owners put too high a value on their property, and partly on account of those vile Hindoos having had so much money spent in their name that investors are scarce.

Bömmel Island, Aug. 14. JOE BADDELEY.

THE GREAT CAPE DIAMOND.

SIR,—Turning to the amusing article in last week's issue regarding the value of the great diamond lately discovered in South Africa, it would necessarily be inferred that the old rule for valuing diamonds consisted in raising the value of 1 carat to the power represented by the number of carats of the gem, and the writer appositely points out, that assuming 1 carat equal to 12, under such rule the present holders of the stone would receive on such valuation exactly 17, there being no doubt that 1457 = 1. But, on the other hand, should the generous, albeit crafty, diamond dealer reduce the value of 1 carat to 19s. by the above rule the stone would be represented in value by a sum in pounds sterling consisting of 580 odd integers—an amount far beyond human conception. The old rule under which diamonds were sold I have understood to be—squaring the number of carats and multiplying the result by the value of 1 carat, which in this case, assuming 1 carat equal to 12, would amount to 288,849.—*Adelphi*, Aug. 27. MAX WOODFIELD.

[Mr. Woodfield's arithmetical calculations are, doubtless, accurate, but at present the market value of heavy diamonds is only about 8s. per carat, no squaring; small diamonds can be had for as many shillings per carat. Mr. Woodfield will see from the latest return of the Kimberley Mining Board, published in another column, that including the heavy diamonds, the monthly averages never reach 2s. per carat. If all the diamond stock could be sold at the rate:—1 carat to 12 carats at 5s. per carat, no squaring; and all stones above 12 carats at 8s. per carat, no squaring; there is not a diamond merchant in London or Amsterdam who would lose the opportunity of selling out. This Mr. Woodfield must well know if he knows anything of the diamond market. These prices refer to good, though not necessarily pure colour cut stones, and not to diamonds in the rough (to which by the way, the squaring system never applied), which can, of course, be had more cheaply.]

CALLAO BIS.

SIR,—Your correspondent, Mr. Stephen Trevena, in his concluding remarks, states of this mine, "that there is but 600 ft. standing between the great Callao Mine and the Callao Bis, and why should the first-named mine be so poor when the lodes run in that direction?" It is to the direction that I wish to call the attention of our fossil directorate. On March 20, 1884, Mr. George Volveider, the manager, wrote "That the El Callao Company, No. 6 shaft, had struck a streak of quartz running in the same direction as that discovered here (Callao Bis), with large streaks of gold extremely rich. This again convinces me (the manager) of the certainty of coming into rich material in No. 3 shaft lower down; for, as the El Callao Company continue working towards the south—i.e., towards the Callao Bis, they are finding richer quartz than that taken out previously."

It will be seen from the manager's report that the lode El Callao is working towards Callao Bis. Now, does it not appear inexplicable that El Callao can return 7 ozs. of gold from this streaky reef, while from Callao Bis the return is nil. The directorate have the advantage of a consulting engineer, who has reported favourably upon Callao Bis, New Callao, West Callao, and the last of the group, Cartago; and yet with all this talent, supplemented by their own, they cannot discover the direction that the El Callao lode takes, though it is only 600 ft. from Callao Bis, and being worked with such signal success towards the latter. Can any of the readers of the *Mining Journal* elucidate the mystery?

A. G. Gosport, Aug. 26.

AN AUSTRALIAN GOLD MINE.

SIR,—In last week's *Mining Journal* is an account by your Sydney, N.S.W., correspondent—"R. D. A."—of a new find of gold in Queensland of a very extraordinary kind, not only on account of its richness, but also on the geological formation in which it has been discovered. I do not purpose taking up your valuable space with any remarks on this, as being ignorant of the surroundings I can add nothing of interest to "R. D. A.'s" letter and description. My sole object in noticing it is to draw attention to the remarkable coincidence of the gold saved, which is as nearly as possible in exactly the same proportion as given by the Hon. H. C. Burchard, the director of the United States Mint at Washington, which I have quoted in your columns—a little under 50 per cent. of that known to be in the stone.

"R. D. A." says, "Having now shortly described the remarkable occurrence and purity of this Mount Morgan gold, a not less interesting though less satisfactory fact is this—that only about half the gold is extracted by the ordinary quartz crushing and amalgamating machinery." As "R. D. A." says "the ordinary crushing and amalgamating machinery," it is only fair to say that an amalgamator that can save over 90 per cent., instead of 50, may be considered an extraordinary machine. Now, this I claim has been done by one of my patent quicksilver-wave amalgamators at the Conrad Hill Mines, North Carolina, for over 11 months past. When first set to work there it was placed to receive the tailings that had passed over three amalgamating copper plates. The plates saved 4 ozs. of amalgam, and the amalgamator saved 23 ozs. of amalgam that had passed the plates. When the three plates were removed and the pulp passed direct from the stamps to the amalgamator the result was 64 ozs. in the machine, thus showing the uselessness of the plates.

I need not enter into details to show how superior mechanical means are to chemical processes, even in rich ores, for "R. D. A." supplies this; but such a loss as 46 ozs. 2 dwts. 12 grs. per ton in the tailings when only 39-32 ozs. were saved is a most startling statement, as showing the need of something more than an ordinary amalgamator. But this is not the only startling statement, for he further states that a second lot that yielded 169-86 ozs. per ton, was followed by a loss in the tailings of 64 ozs. 5 dwts. 18 grs., or more than 38 per cent. beyond the previous lot. Now, if this saving could be accomplished only by an expensive or by a complicated process, or by one that required constant attention, some allowance might be made for using old ordinary processes; but in the use of my quicksilver-wave amalgamator neither attention or even watching is necessary, for means have been provided for lubricating the moving parts; it can be kept at work locked up, until the quicksilver is too heavily charged with gold, when a fresh supply is easily added without stopping the machine, and all this can be accomplished at an expense of working that shall not exceed 1s. per ton. Chemistry is quite useless except in treating small quantities in the laboratory, for the ingredients employed must be wasted after once being used, or their recovery will cost more than their value, when treating thousands

or even hundreds of tons, to say nothing of the undesirability of requiring complicated chemical processes to be carried on in the wilds where mines are usually situated, when with a machine that needs no attention, and requires only pure quicksilver to be used much above 90 per cent. can be obtained, instead of the usual 50 per cent.—*Wharf-road*, Aug. 26. HENRY MOON.

INDIAN GOLD MINES—THE ANCIENT MINERS.

SIR,—Captain Plummer's late reports on the depth to which the native miner has formerly sunk in the Mysore gold field, in addition to my own personal two years' observation of the topography of the district have strongly impressed me with the conviction that former workers mined under much less disadvantage than is generally supposed. With such primitive means at their disposal as earthen chat ties and wooden buckets it is impossible to conceive them able to keep their levels clear of the amount of water now encountered, and which is with difficulty kept under by the employment of heavy pumping machinery. Assuming, moreover, that these men wrought the rock by means of naked fire, in the same manner as the surface gneiss is to this day quarried in Mysore, it is difficult to imagine this operation being successfully conducted in a dripping tunnel, save under circumstances of a very exceptional character. There is no doubt that much more water now finds its way into the workings than did in the old men's time, and I have little hesitation in pronouncing the great number of water tanks in the neighbourhood of the present workings to be conducive to this result. These tanks are simply huge lakes formed by dams erected across the wet season watercourses; and as their area in the mining district can be reckoned by many hundreds of acres it is not surprising to find a water level at a short depth from surface.

Practically, for mining purposes, these tanks are of no avail; meanwhile they breed fever, and are in many other ways objectionable. The only loss occasioned by cutting the dams would, therefore, be the possible cultivation of a few paddy flats below them—a matter for compensation to the ryot. I am fully persuaded that if the tanks round the Mysore Mines were drained the underground workings would become practically dry. Sufficient water for use in the camps might be retained in cemented reservoirs.

Kensington, Aug. 27. ROWLAND J. ATCHERLEY.

DEVALA-MOYAR GOLD MINING COMPANY.

SIR,—The mine manager's report to the directors, dated Harewood, Devala, Oct. 30, 1882, states as follows respecting Kintail Reef:—This is situated to the south-eastern boundary of the Kintail estate; it lies very flat, and is from 6 ft. to 10 ft. thick. We have uncovered two acres of it, and put in six cuts, following the reef as it dips, and taking out the whole width of the reef; the lengths of the outcrops are from 50 ft. to 150 ft. From the records in the office this reef is said to yield from 7 dwts. to 14 ozs. per ton. At 5 dwts. it would pay splendidly, and from the appearance of the stone and the gold I can see I should judge it would yield that or more. There are hundreds of thousands of tons in sight which could be broken out and taken to a mill at very small cost. We had partially prospected several other likely looking reefs, from all of which we got gold, and from some of them splendid gold, when I received your instructions to confine my attention to Strathearn Reef. We have therefore done very little prospecting since. During some years much money has been spent in testing the Strathearn Reef, which has lately been abandoned as worthless; but I am unable to trace that any effort has been made to test the Kintail Reef, which trial could have been made without delay, and at a nominal cost. No one probably anticipates finding ore worth 14 ozs. per ton in the Kintail Reef; such a notion could only have existed in the mind of some bare-brained speculator; but the mine manager decidedly lends himself to the belief that some 5 dwts. per ton could be extracted from the ore. As one interested in the success of the Devala Company I think much more vigour is required in the management of the mine.

SHAREHOLDER. Pall Mall, Aug. 28.

GOLD IN WALES (LEASES)—No. 1.

SIR,—I was glad to read the communication of Mr. R. Symons in last week's *Journal* on mining leases. Now that the Office of Woods and Forests are anxious to make equitable arrangements with persons desirous of prospecting and working the Crown mineral properties, and Lord Robartes, Lord Lisburne, and other well-known minelords, have already set admirable examples, I cannot help thinking that at this crisis, if persons interested in the employment of mine labour would give to your pages their experiences of the operation of mining leases they would have a very beneficial effect almost instantly.

It is quite true, as I wrote the other day, whilst adventurous people of the mining persuasion were both able and willing to pay high rents and royalties, minelords were quite within their right in taking all that people were willing to give them. And it is equally true, as Mr. Symons puts it, that "because applicants for leases never tried to get better terms than the lords or their agents proposed, the evils complained of have been continued till now." To go further, "applicants for leases appeared to think that the conditions were irrevocable, instead of regarding them as subjects for discussion and arrangement." Everybody seems hitherto to have thought of a minelord as some anxious people did of King Darius, in that he had made a law, Mede-and-Persian fashion, which could not be altered. Happily we are neither Medes nor Persians, and minelords amongst us some of them have set their hearts as Darius, in the right direction for deliverance from a grievance, and it is hoped that others will not do as Darius did—that is, yield to counter persuasion of agents.

It would be utterly absurd to suppose for a moment that minelords are not amenable to reason. If they have never been solicited to do a certain thing the shortcoming is evidently on the side of the would-be applicants. Stone only was asked for, and stone was granted; bread has to be asked for now, and if petitioned for earnestly bread will be had along with the stone. Importunity will prevail. Mining leases, as a rule, do not contain unreasonable clauses, with the exception of rent and royalty, which at the present low prices of metalliferous minerals lessees find impossible to pay.

When direct access to a minelord can be had there is seldom any difficulty in getting equitable leases. But minelords often have neither the time nor ability to manage their own property; and, therefore, necessarily employ agents, competent or otherwise, who are not always so considerate towards tenants, as the lords would often be did they themselves manage. Agency is sometimes synonymous with exaction, because increased rent-roll is a passport to approval, and tenant-squeezing has, consequently, to be resorted to, forgetful that circumstances alter cases, and that the wisdom of life is to make the best of them. As to royalties, for example, it is quite possible for 1-20th to bring more grist to the minelord's mill than 1-10th. In the present day 1-20th may bring something to him, but in very few cases it is possible for 1-10th to do as much.

True, there are occasionally very absurd clauses introduced into mining leases. I know of one. It ran to the effect:—"You shall not nor will employ any miner who has been, or intends to be, a poacher." No harm ever came of it that I know of.

Of course, as some of your correspondents suggest, it would be far more beneficial to lessees if royalty could be paid on profits only. But, whilst admitting this, it appears altogether useless to expect it, inasmuch as it would involve an audit system both expensive and troublesome, with which few minelords would care to be bothered. The remedy seems to lie chiefly in an appreciable reduction of royalty, say, to 1-20th, or better still to 1-25th on produce.

In the matter of Crown licenses to search for and work "gold and gold ore" of the old rocks of Merioneth, a rule is, or rather is proposed by the Office of Woods and Forests, which I will leave to others to call absurd or not, as they may happen to think it.

A applies for a license (prepaid) to search for and work for "gold and gold ore." It is granted on the usual conditions, but copper, lead, and zinc ores are not demised, although they may be remuneratively auriferous. From these ores the gold must not be extracted by A. What is to be done?

The Office of Woods tells A to apply for a second license (prepaid) to search for and work the baser metals on the same sett. A dissents from this, and is told that if he does not it will be let to B, or anybody else, on pre-payment. Now, this does not seem to be in any



degree clever, for assuming that B takes the sett for the baser metals (for the fun of the thing even), B at the first go off would certainly want to work at the same time and at the same place with A. Both being entitled to the same spot for spoil-heap, &c. Supposing they worked in separate places, A might say to B—Well, Sir, see by my license that I have had demised to me all the "gold and gold ore." I request you not to sell that pile of galenite, chalcopryite, sphalerite, and tetradymite, as I claim it as "gold ore." B might shrug his shoulders and say, you may have what you find of galenite, chalcopryite, sphalerite, and the other stuff, if they are "gold ores," but I shall stick to my lead, copper, and zinc ores, they being demised to me as the baser metals. What is now to be done; write to the Times? No, the times are changed. B says he will write to the office for a definition of "gold ores," and in the meantime he warns A against taking any of his baser metals, not even a bit for assay for gold and silver. A retorts by warning B against taking away a grain of his gold or gold ore, as that all belongs to him and he is accountable to the Crown for it, and has to make a statutory declaration regarding the produce to value. You are one, says A; you are another, says B. After awhile, by the time the license expires, an armistice has set in. They agree to hitch horses and work amicably together. They apply for a new license to work for gold and all other minerals and metals whatsoever, and it is not at all certain that they will get it, either jointly or severally.

This curious arrangement will most likely be abandoned, and Crown Mineral licenses in future will include all metalliferous minerals at the same royalty. Everybody is hoping that it will be so. London, Aug. 27. T. A. READWIN, F.G.S.

#### BOGUS SCIENCE—THE MINE INDICATOR.

SIR.—Under heading as above in last week's Journal I was interested in reading a communication from Mr. T. Bartlett. In my opinion, out of no other person's brain than that of a Yankee's could such a stupendous idea be hatched as to invent such a wonderful thing as a mine indicator. There is not a doubt but that such an invention would be doubly acceptable to the mining world, and I would recommend as an important adjunct to the power of the invention that the inventor should invent something to find out at the same time he is indicating where a mine is whether the mine would pay for working or not. Unfortunately Mr. Bartlett cannot say in which branch of science Mr. Lighthill has taken out his degrees as Doctor Hocus-pocus, Medicine, or Divinity. I should say, judging from his name, which has a suspicious look with it, that he is a doctor of the first-named science.

The virtues of the dowsing-rod pales into insignificance before the doctor's invention, and should it prove a success with the important addition I have proposed a new era will certainly dawn upon mining, and there will be no more risks to run, no more fortunes to be lost in endeavouring to make a mine pay, and last, but not least, the much abused agent will have in the invention an invulnerable shield to protect himself with from the attacks of the shareholders in case of a fluke. The process of mining will then be simplicity itself. It will only be necessary to procure funds to hire the doctor, or some other cute person who can work his machine, as I do not suppose any ordinary mortal could do so, fix it properly, and if it registers "will not pay for working," or in fewer words "no go," then that is all that is necessary. No calls, or calls in expectancy, thanks to the doctor. If, on the contrary, the needle points to "will pay for working," or "struck it," then operations may at once be commenced, and the success of the undertaking assured to start with. Here, again, thanks are due to the doctor.

It appears that Dr. Lighthill claims that all mineral veins carry an electrical current; for myself I have not dipped deep enough into the Stygian well to vouch for the validity of this claim, but if the doctor had claimed that many veins carry a water current I should have been with him to the letter, and perhaps water currents are what the doctor really means. It is easy for any man to get mixed, and more especially a Yankee, although Yankees are deserving of no small meed of praise for their ingenuity. In the mechanical world alone we have many tangible proofs of the fertility of the Yankee's brain for inventing good and useful machines; and although the San Francisco Mining and Scientific Press may possess powers I wot not of, that periodical has not my approval in anticipating that the doctor's invention would prove a fizzle before it had been tested. I should very much like to know if that same periodical's door-stone is clean of things which have proved a fizzle. Lastly, I would encourage the doctor to go ahead with his invention, as his very name appears to me to denote fame, and there may be something latent in him which will astonish even the natives of his own country. The latter have more than once astonished the natives of other countries, and unless that country gets submerged it will repeat its history. Peak Forest, Aug. 26. W. N.

#### THE VAN MINE.

SIR.—From the letter of Mr. W. H. Gatty, which appeared in your columns last week there would appear to be a difference of opinion as to the sinking of Edwards' shaft below the present depth of 120 fms. If you will allow me I will point out to you how this difference of opinion exists. At the 120 fms. level, in the sole of it, a very rich and wide course of ore was found; but instead of having a direction of east and west, as is the proper direction of the Van lode, this new course of ore seems to run south-west, and away from the Van lode, and which would leave Edwards' shaft too far north for opening it out properly. As this is a matter of great importance to every shareholder in this company, some of whom have recently purchased heavily at my recommendation, I have advised them, as I would all else having anything to do with the future of the mine, to call in Capt. Nicholas Bray, who inspected the mine just previous to its becoming the richest mine in the Principality, and whose report has been thoroughly verified, to get his experience and judgment, not only on that point but on every other relative to the future profitable working of the property. In conclusion I think it would be easy to make Edwards' shaft available for all necessary purposes down to the 120 fms. level, and from that point to carry down the shaft as an inclined plane on the angle or dip of the supposed new lode and new course of ore gone down under the 120; and as the directors will be naturally desirous of making no mistake about this after their attention has been called to it in the *Mining Journal* I confidently rely on their getting the opinion of some reliable mining authority before they determine the mooted point. Goginan, Aberystwith, Aug. 26. ABSALOM FRANCIS.

#### IMPROVEMENTS IN DRAINAGE OF MINES.

SIR.—Hitherto the Cornish pumping-engine and pump have been in general use throughout the mining world, and in point of economy of fuel this engine has proved itself far superior to any other, and especially where large quantities of water have to be contended with, and the pump has also been generally considered the best; but recent experiments have shown a very great improvement in its construction, and this improvement is effected by simply changing it from a single to a double-acting pump. This has been done in various ways, but with great loss of power until very recently. It very often happens that an unexpected increase of water overwhelms the pump and inundates the workings, necessitating great outlay and loss of time in providing larger pumps. A case of this sort occurred at the Huntington Copper and Sulphur Company's mines in Canada a short time ago, the drainage being quite inadequate to the influx of water; and in this case it was all the more embarrassing, as the shaft, which was 100 fms. deep, and in hard rock, was too small to admit larger pumps, and the expense of enlarging would have been very great, besides a great loss of time; and under the circumstances, before going to this great outlay, I decided to try an experiment, and designed a double-acting pump, which was constructed by Mr. George Brush, engine-builder, of Montreal, and in which was preserved the essential working part of the Cornish single-acting pump as far as possible; the great difference being in the piston or plunger, which was enclosed in the cylinder, the piston-rod only protruding from the cylinder instead of the whole area of the piston, and it was found that, besides being double-acting it did away with the counter atmospheric pressure which acts so prejudicially to the single-acting plunger. It is a well-known fact that there is an adverse atmo-

spheric pressure of about 15 lbs. per square inch during the suction in the single-acting pumps, which is entirely annihilated in this double-acting one, effecting an economy of fuel of 20 per cent. This was found to answer so well, that a second one was immediately ordered, and effected the drainage of the mine in the most satisfactory manner during the execution of the work, which lasted about a year. Combined with this, there is also an improved method of admitting water to the pump, which prevents all foul water and sand entering it, and this is, perhaps, not the least part of the innovation, the old method of admitting it being so defective that mud and sand is drawn in with it, causing great destruction of valves and working parts, the drainage to be often interrupted, and consequent accumulations of water into the bottom of the shaft, which, of course, causes the sinking to be often interrupted, which is a very serious matter, and has been the ruin of many companies.

This pump has many advantages over the old one. In soft timber ground it is found very difficult and expensive to keep open a large shaft, and this, occupying only about half the space of the old pump, is specially suitable for such ground; and, being only about half the weight, it is also very suitable for countries where transport is difficult and expensive, and the pump-rod is proportionately light, economising about 35 per cent. on first outlay. It can be worked by a wood or iron rod, and by any kind of pumping-engine; and to convert the old single-acting pump into a double-acting one, it is only necessary to change the valve-boxes and cylinder, the same pump-rod and columns answering for the double-acting pump, so that the expense of doubling the discharge of water is very trifling. As to its durability, it is in every respect equal to the old one. North Shields, Aug. 28. WM. NANCE.

#### GREAT WHEAL VOR MINING DISTRICT—WHEAL SINGER.

SIR.—In my last letter I promised particulars of this mine, which was started about 12 months ago. It is situated eastward of and contiguous to the celebrated Great Wheal Vor, in the parish of Breage, which yielded a profit of 272,000£. It contains several of the Polladras Downs lodes, which supplied to Wheal Vor Company a considerable quantity of tin ore, including Wheal Gwen's lode, from which 20,000£ of tin ore was produced. The same lode in New Great Wheal Vor at the east has been exhausted for a considerable length from the surface to the adit, which is 14 fms. deep, and so far below as the ancients could go with the imperfect appliances, which proves that it must have been productive.

The operations in Wheal Singer are at present limited to one lode, called Bound's lode, on which a shaft has been sunk about 22 fms., the underlie being northerly 2½ ft. in a fathom. At that depth a level has been driven in the lode 10 fms. east, and 11 fms. west of that shaft. The width of the lode is about 6 ft., and the content is tinstone, yielding tin ore (black tin) varying from ½ cwt. to 2½ lbs. to the ton. The average is about 40 lbs. to the ton of stuff, but I saw ½ ton of tinstone in a house there, yielding about 50 per cent. of black tin. There is a parcel of tinstone at the surface of about 350 tons taken from the level ready for metallurgical treatment. South of Bound's lode are two lodes indicated by the ancient operations on their backs, and there is also Trueman's lode, which underlies into this sett from Wheal Vor. North of Bound's lode there are Garth and Singer's lodes, as well as Wheal Gwen's lode, all of which were productive in Polladras 60 years ago and less. From the adit level north of Crease's engine-shaft in Wheal Vor there is a cross-cut northward to a lode in this sett, from which there is a drift 12 fms. westward containing a little tin.

On the mine there is a 14-in. rotary engine of very good quality used in pumping the water, which is very light. There are also a horse-whim, smithy, and dry. The works are under the control of Capt. Roach and Capt. Nicholas James—men of recognised mining talent and experience. On the western side of Wheal Vor, near Carleen, is a very wide cross-course, and east of Wheal Vreah (part of Great Wheal Vor United) is another cross-course, passing through Poldown Mine, and a little eastward from Wheal Singer. I am credibly informed that the tin returns in Wheal Vor—between these cross-courses—realised 3,000,000£, and in Poldown 499,126£.

The ground may be said to be "virgin," because the ancients did little more than "scratch" the lodes. We have had several years of great mining depression in this district, but I am hoping that the good prospects presented in Wheal Singer will give an impetus to mining therein. Breage is a first-class tin-producing district. Truro, Aug. 26. R. SYMONS.

#### GREAT WHEAL VOR DISTRICT.

SIR.—North Metal Mine is one of the few mines in this district now at work, but there is a manifest lack of energy in the operations, owing, I presume, to the fact (if I am correctly informed) that one gentleman only has to supply all the funds. The works at present are limited to the sinking of a new shaft on a lode south of the engine-shaft, and to the prosecution westward of the 30 fms. level on the engine lode, the quality of which I know not. Success has not as yet attended the adventure, but the position of the mine seems to warrant success in the future. What was at first considered Wheal Vor main lode does not appear to be it. Whether the lode on which the new shaft is being sunk be that lode remains to be proved. No one knows how the Poldown cross-course has shifted the lodes, the ground here being undeveloped. It will be interesting to discover the heaves, if any, of the Wheal Vor lodes. I never heard whether, at Poldown, they ascertained the effect the cross-course had on the lodes there. If the agents ever knew I will enquire into this on my next visit.

On Saturday last I heard cheering news regarding Great East Vor, that the miners, in driving a shallow level, came upon a vein of tinstone about 5 in. wide, so rich in quality as to be worth 20£ per fm. There are four men at work at New Great Wheal Vor. The engine-house is erected, but no engine placed in it. I suppose that the want of capital restrains effective operations. The adit is 14 fms. deep. To that level the lodes have been cleared away; and, as there is little debris on the surface, it is naturally assumed that the contents were removed to some stamping mill or mills for reduction and manipulation by the old men. Justice, so to speak, has never been done to this mine by modern workers. Little done under the adit. Truro, Aug. 27. R. SYMONS.

#### THE MINERAL RESOURCES OF CORNWALL.

SIR.—An impression seems to pervade the minds of some that Cornwall has been pretty well exhausted of minerals. Nothing can be more wrong, however, in point of fact. The proportion of mineral veins now intact to those that have been wrought is so great that to exhaust them for ages to come would be a matter of impossibility, supposing mining operations to be carried on on a much larger scale than they have ever yet been. To infer that the richest veins have already been worked is equally without foundation, as operations prove the contrary. It may be truthfully stated Cornwall contains almost unlimited quantities of minerals. GEORGE RICKARD. Islington, Aug. 25.

#### THE THOMPSON PULVERISER.

SIR.—Will you permit me through your columns to express my regret that I was unable to be present at the meeting of the Miners' Association of Cornwall and Devon, when Mr. Rickard read his paper "On the Thompson Pulveriser," and to remark that no advantage can be gained by making either the stamps or pulveriser do the work of the stone-breaker; with a combination of the two machines the most economical and best results are obtained. Whilst stamps expend much power without a corresponding useful effect the Thompson pulveriser, by its system of regular feed and discharge, utilises to the fullest extent the power applied. R. A. SMITH, Secretary Globe Mill Co. Lombard-street, Aug. 25.

IRON AND MANGANESE ORES.—MR. E. S. FERGUSSON (Cardiff, Aug. 27) writes:—The iron ore market is slightly firmer, and buyers are paying improved prices. The freight market is also firmer, rates from Bilbao to Cardiff or Newport being 5s. 3d. to 5s. 6d. and to Swansea 5s. 9d. Sellers' quotations for ore range from 11s. 3d. to 11s. 6d. c.i.f., and a limited amount of business has been doing. For the winter months the market appears to be improved. Manganese ore continues in feeble demand. Manganese is firm, at 1s. 5d. per unit c.i.f. Liverpool.

#### FOREIGN MINING AND METALLURGY.

Prices have scarcely varied in the Paris Iron Trade, merchants iron continuing to make 67. 8s. per ton. Some reductions might probably be obtained, however, from the rate nominally current in the case of transactions of any importance. There would certainly be an avowed reduction in rates if firms in the Longwy and Namur districts had not been curtailing their production of late. The imports of iron minerals into France in the first seven months of this year amounted to 790,499 tons, as compared with 956,827 tons in the corresponding period of 1883, and 836,936 tons in the corresponding period of 1882. The imports to July 31 this year were made up as follows:—Belgium, 118,407 tons; Germany, 230,200 tons; Spain, 281,967 tons; Italy, 38,599 tons; Algeria, 108,711 tons; and other countries, 11,888 tons. The exports of iron minerals from France in the first seven months of this year were 60,475 tons, as compared with 59,066 tons in the corresponding period of 1883, and 64,973 tons in the corresponding period of 1882. Affairs in the German iron trade about maintain their customary aspect. There are no very great complaints, but at the same time orders must be admitted to be scarce. The German steelworks are still pretty well employed. A contract for three locomotives has been let at Stenaburg to a firm at Grafenstaden.

An adjudication for trucks for the Belgian State Railways is to take place Sept. 3, and industrialists are competing for this contract with a keenness which affords a forcible illustration of the present unfortunate state of affairs. It appears probable that the extremely low rates which prevailed at the last adjudication will be still further reduced upon the present occasion. The impending adjudication is not, after all, one of any very great importance; but when firms are much pressed for work an order for even 100 trucks is, of course, extremely welcome. English pig has remained at 27. 2s. 6d. per ton upon the Belgian markets. Athus has almost all its production engaged until the close of the year at 27. 2s. 6d. per ton. The price of No. 1 iron for export has remained at 47. 10s. per ton, but on home account 47. 12s. per ton is paid for every-day orders. No. 2 has made 47. 16s. per ton, and No. 3 57. 2s. per ton. Girders have made 47. 16s. to 57. per ton. No. 2 plates have been much depressed, at 67. 4s. per ton, while No. 3 have made 77. per ton. The latest quotation for plates of commerce has been 87. 12s. per ton. The Netherlands State Railways Working Company has sold 15,425 tons of old rails to a Rotterdam firm.

The Belgian Coal Trade has remained generally without change. The last adjudication of contracts for coal required for the Belgian State Railways exhibited, however, a rather sensible decline in the prices of some descriptions as compared with those noted at the last previous adjudication. Coal for household purposes has been better supported in Belgium than industrial coal. Quotations have also shown more steadiness in the Couchant de Mons and Liège districts than in the Hainaut. The German coal trade has not experienced much change during the past week. It appears from official returns that the imports of coal into Germany in the first half of this year were 931,051 tons, while the exports of coal from Germany in the same period were 4,081,923 tons. In the first half of 1883 the corresponding imports were 954,710, and the corresponding exports 3,995,642 tons. The imports have thus diminished 23,639 tons this year, while the exports have increased 86,280 tons. The imports of coke into Germany in the first half of this year amounted to 52,481 tons, as compared with 83,668 tons in the corresponding period of 1883. The exports from Germany in the first half of this year were 331,953 tons, as compared with 296,284 tons in the corresponding period of 1883. The exports of German coal to Italy via the St. Gothard appears to be slightly increasing.

#### REPORT FROM DERBYSHIRE AND YORKSHIRE.

Aug. 28.—Recently some of our mines have shown to better advantage than for some months previously, for there has been a better demand for some kinds of coal. Lead mining, however, does not appear to have undergone much change, for it makes no progress. At one time it was about the most important of the Derbyshire industries; but now it does not find employment for a thousand persons at the surface and underground. This cannot be said to be the result of the low price at which lead has sold during the last few years, for matters were not so very much better when higher prices were obtained. Many of the mines, if they can be so called, are worked by ordinary miners without capital, and in the old and rude manner. These can scarcely be expected to pay well under any circumstances. But even as things are now some of the mines carried on with capital and the necessary machinery essential to economical working. It is said that there is no dearth of lead ore in the county, and to some extent this is borne out by the reserves that are held in connection with some of the mines now being extensively worked, especially by Mr. Wass, whose large outlay for the best machinery and plant is said to have well repaid him. There is, therefore, no reason why Derbyshire lead mining should not again occupy something like the place it formerly occupied amongst the lead-producing counties in the kingdom, of which it is about the oldest, for the ore in the Peak and Wirksworth districts was worked by the Romans, and in all probability before their occupation of England.

Coalowners in most parts of Derbyshire have had anything but a good time of it during the last two or three months; but matters, as before stated, are now looking rather better. An increased tonnage of both Silkestone and other coal has been raised of late, more being required for the London market. The Staveley Company have several Silkestone pits, the coal being of excellent quality, whilst the Top-hard is also worked. The Butterley Company have a number of pits at Ripley, Langley Mill, and other places, from which they draw a large tonnage of coal; and the Sheepbridge Company, like the Staveley, work both the Silkestone and the Top-hard. The Silkestone seam is an excellent house and gas coal, whilst one part of the Top-hard cannot be surpassed for the raising of steam and the smelting of iron. The little increase in the business lately done would appear to be principally in Silkestone, which is a great favourite in the London market, and certainly equal to the best Wallend when well screened, although it usually sells for about 2s. per ton less money. Steam coal has gone off moderately well of late, but the ironworks and railway companies undoubtedly take the most. Only a comparatively small quantity is sent to the Metropolis for steam users or for kitchen purposes, although it is well adapted for the latter purpose, being hard, hot, and lasting. More gas coal is going off just now, the time for increased deliveries having now set in, and this, of course, will continue to be the case to the end of the year, and even beyond. This, of course, will make no difference to prices, for the gas companies make contracts in July as a rule, stipulating as to the deliveries in each month. Coal for manufacturers still meets with only a moderate sale, and as there is a good deal of competition prices are the reverse of remunerative. The colliery owners in Derbyshire, for some remote and unexplained reason, do not take kindly to the idea of becoming cokemakers, although it must be the most profitable branch connected with the coal trade. The consequence is that we allow heavy importations from the South Yorkshire district, and from which, after carriage is paid, there is a fairly good profit. Were it made on the spot there would most certainly be a good return for the outlay in erecting the ovens, the Derbyshire seams of coal being identical with those in South Yorkshire, from which the coke is produced.

The Iron Trade of Derbyshire has continued steady, for the demand on the part of the Staffordshire and other consumers is considerably less than what it was. The local foundries, however, absorb a larger quantity in the production of pipes and heavy castings, which keep them fairly going. One of the oldest of the Sheepbridge Company's furnaces has just been put out of blast, preparatory to being pulled down, having been in constant work for about 14 years. The lighter foundry branches continue rather quiet; but their output of malleable iron material has kept up favourably.

In Sheffield several specialities have ceased to be turned out, the season being over for them, or so much so that dealers have taken as much as they require for the present year. This includes scythes, hooks, forks, and similar articles for the field, for, although machinery for almost every kind of agricultural work has been successfully in-



placed, yet hand-labour has not fallen off to anything like the extent that they might expect, and this is seen in the really great demand which has prevailed for the tools alluded to. Australia, of late, has sent some few orders for agricultural implements as well as general hardware goods. America has not ordered as yet, and the total business done with that country for several months past has been trifling in comparison to what it used to be. The principal cutlery houses are just able to keep their hands as usual, but the small masters who are engaged on a commoner class of goods are not able to do so much. Some few foreign orders have, however, been booked for daggers, bowie, and similar knives, whilst there is a steady output of machine, butchers', and ordinary trade knives. In sheepshears makers there has been a fair time of it, as those engaged in the production of sheepshears, hoes, spades, and shovels have also had. Some heavy castings have lately been turned out in crucible steel, especially for powerful presses, and a good deal has also found its way to the leading steel-makers, who are most energetic in pushing forward trade even in this particularly dull season. The make of Bessemer has kept up the average, especially in the form of billets, as well as for general forgings. Ordinary ship and boiler plates have continued rather quiet, but there is still plenty doing in the steel-faced armour plates the Atlas and Cyclops Works.

## REPORT FROM CORNWALL.

Aug. 28.—There has been a pervading spirit of dullness of late, and the general attitude has been one of expectancy—a waiting for what may turn up. Under these conditions business in the share market has naturally been slack, and unless where special reasons exist, prices have not been maintained. Still the fluctuations, as a rule, have been of an unimportant character, pointing to continued activity rather than to any marked depression. The change that will benefit mining materially must affect trade generally, and not merely one section of our industries, and of that we see little prospect just at present.

Among the points in the report of Mr. Frecheville, as Inspector of Metalliferous Mines for the West of England, which are of more than ordinary interest, are his remarks on the decrease of the number of persons employed in mining enterprise in the district, when taken in conjunction with the figures given for the returns of produce. Thus, while there had been in 1883 a decrease of 1916 persons or 10.22 per cent., chiefly, of course, in Cornwall, there was an actual increase in the production of black tin of 631 tons over 1882, bringing up the total to 12,738 tons. The decrease was not wholly confined to tin mines, but was chiefly among them; and the two facts appear to contrast rather remarkably. The explanation is, however, very simple, and furnishes the most emphatic proof we have yet had of the immense importance to our local mining of the introduction of boring machinery, and, *pari passu*, the improvement of various mechanical appliances. Ten years ago a decrease in the number of hands employed would have meant an equally serious decrease in the output. Changed conditions now show this economical tendency, and indicate another element of vitality in this long-enduring industry. The present production of the tin mines of Cornwall (for those of Devon only contribute 70 tons to the total) is very remarkable. Notwithstanding the severity of the depression, and the number of mines that have been shut up, the county is now raising annually an amount which is considerably in excess of that of many years during the past quarter of a century, and is above the average of the whole period. Of course the present Dolcoath is largely responsible for this; but then Dolcoath is only typical of the enormous extent of the unexhausted resources of the county; and though the amount of employment has fallen off, and is little more than half what it was 12 years ago, it is far satisfactory to find that, even in this respect, the figures for 1883 are not below the average of the preceding half-dozen years, and still continue materially above those of 1878 and 1879, when the cloud of depression was at its darkest. Mr. Frecheville regrets that the depression seems likely to continue; but we think there is hope that the worst is over, and that there are fewer special disturbing causes at work in 1884 than there were in 1883.

So far as the safety of life is concerned, if all we had to go by were the figures in Mr. Frecheville's tables we should be compelled to admit that the attempt to regulate our mines in this direction had been a failure. The loss of life in 1883, in proportion to the number of persons employed in the district, was greater than has ever before been recorded—one death to every 420 persons employed. For the whole of the kingdom the proportion was one to every 495; and for coal mines only, one to every 488. This shows clearly the unenviable pre-eminence in disaster which Cornwall had attained. Taking the general return for the whole of the kingdom since 1851, a fairly progressive series is shown of from one death to every 219 employed in the former year to one to every 551 in 1876, which is the most favourable—the decades showing an advance from one to 245 to one to 300, and to one to 425. Over the three years that have yet elapsed of the present decade the improvement is maintained, apparently everywhere save in Cornwall. Of course, 1883 had an exceptional fatality in the loss of 12 lives in the catastrophe at Wheal Agar; but there was nothing in that to take it out of the category of preventable "accidents," and it seems a plain duty to enforce the lessons of these figures in showing that the chief cause of loss of life in our mines is still the wanton disregard of rules, and the culpable recklessness of the men themselves.

## REPORT FROM LANCASHIRE.

Aug. 28.—If anything, there is a tendency towards a slightly steadier tone in the Coal Trade of this district, but it is based more on anticipations of an increasing trade coming forward next month than upon any appreciable improvement in the demand at present. The leading Manchester firms are, with the close of the month advancing the wharf prices for their house-fire coals 10d. per ton, and generally there is strong determination, so far as ordinary trade transactions are concerned, not to give way any further upon present rates. The demand, however, for all classes of round coal continues very dull, with pits not working more than three to four days a week; and although quoted rates are maintained, there is still a good deal of coal lying under load, for which sellers are open to offers at very low figures where buyers can take quantities for prompt delivery. The average quoted rates at the pit mouth remain at about 8s. 6d. to 9s. for best Wigan Arley, 6s. 9d. to 7s. for seconds, 6s. 6d. to 7s. for Pemberton Four-feet, 5s. 6d. to 6s. for common round coal, and 5s. to 5s. 6d. for steam and forge coals. There is a moderate demand for engine fuel, but supplies continue amply sufficient for requirements, slack, if anything, being even rather more plentiful than it was, and prices are only barely maintained at late rates. Burgundy remains at about 4s. 6d. to 5s. per ton at the pit mouth, but it is only in exceptional cases that more than 4s. to 4s. 3d. is being got for best slack, and common sorts average about 3s. 3d. to 3s. 6d. per ton. There is a fairly large quantity of common round coal going away for shipment at low prices, good qualities delivered at the Garston Docks or the High Level, Liverpool, averaging about 7s. to 7s. 3d. per ton.

In the Iron Trade the weight of business doing so far as all branches are concerned continues very small. At the very low rates now current in the market there is, however, comparatively little actual pressure to sell, and prices remain about stationary. Buyers, however, simply give out orders from hand to mouth at the minimum figures, and, although for all classes of metals prices are now very nearly as low as they were at any period during the depression of five years ago, there appears to be little or no disposition to enter into speculative transactions. In pig-iron a small business is being done in the local and district brands at the minimum rates of 41s. to 42s. less 2d. delivered equal to Manchester, but in outside brands, such as Middlesbrough and Scotch, for which prices rule higher, only small occasional parcels are being sold for special requirements. Hematites still meet with only a small enquiry, and good foundry brands delivered here are to be got at about 44s. 6d. less 2d. In the manufactured iron trade rather more enquiry is reported for sheets, but other classes of goods continue dull of sale, and no better prices are obtainable. In good qualities of Lancashire and North Stafford-

shire bars delivered here 5l. 12s. 6d. remains the average price, with common local brands to be bought at 5l. 10s., hoops are quoted at 6l. to 6l. 2s. 6d., and sheets at 7l. 2s. 6d. to 7l. 10s., according to quality.

Although among engineers generally there is still a fair amount of work in hand, tool makers continue to complain that new orders are getting rather scarce, and in other branches dependent upon the engineering trades a slackening off is reported, with prices cut very low to secure new orders.

## REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

Aug. 28.—Consumers of raw iron are this week prepared to buy forward in considerable lots at present prices to dates beyond those at which vendors will book contracts. The end of the year is about the latest date that sellers will consent to anticipate. Native pigs are quoted 57s. 6d. to 56s. 3d. for all mines, 42s. 6d. for part mines, and 36s. as about the minimum for cinder sorts. With Sept. 1 railway carriage rates for the conveyance of pigs from Cleveland will be reduced about 1s. 3d. per ton, and from South Wales about 10d. per ton. Messrs. G. and E. Thomas, of the Hatherton Furnaces, Wall-sall, are this week blowing out their last all-mine furnace. Finished iron shows some improvement on the week. Sheets are in better demand for forward delivery, and a few makers of galvanising sorts ask a 5s. per ton advance upon the late minimum. This brings doubles up to 7l. 10s. to 7l. 12s. 6d., and latens 1l. per ton additional. Less favoured makers will, however, accept doubles at 7l. 5s. The demand for coal is unchanged.

The strike has now entered upon its ninth week. The men appear to be no nearer to the attainment of their object than they were at the beginning, whilst the money they have sacrificed in wages already amounts to many thousands of pounds. Exaggerated statements are still being made by the men's leaders concerning the number employed at the old rate. Mr. Barnes, the operative's secretary, estimates the number 11,000, but the masters state that this is incorrect. The Strike Committee are, however, desirous to alter this state of affairs. They have recommended the men who are employed to keep pits, in order to cease work. They have also determined to request those masters who are paying the old rate, but who have raised the price of coal to pay their men in accordance with the advance in selling prices. The committee assert that they are in a better position now than ever to continue the struggle. An interesting commentary upon the statement that the men cannot live at the reduction is furnished this week by Messrs. Round Brothers, of Tivdale. They state that for the week ending June 27 last (the week before the strike), they paid four pikemen in the Thin coal seams 2l. 1s. 9d. each, and another two 2l. 2s. 6d. each. These men had made 14½ and 15 days, or "stints" respectively, and were paid at 2s. 10d. "per day," or stint. Besides this they were allowed a ton of coal per month and a quart of beer per day.

The ironmakers continue to protest against the masters applying for a reduction in wages. A meeting has been held at Tipton this week, and a resolution disapproving of the proposal has been come to on the ground that the men have in the past few years suffered 13 reductions, and iron has only been reduced four times in that period. On Monday the arbitrator to the Wages Board sits in Birmingham to hear evidence from either side. The Patent Shaft and Axletree Company, of Wednesbury, are eagerly looking forward to the probable reduction in mines drainage rates. They have during the last year consumed 177,415 tons of coal at their works. Of this they have bought 54,000 tons, and raised 123,372 tons from their own property. Upon that latter amount of coal raised, said the deputy-Chairman (Mr. T. Eades Walker), at the annual meeting of the company this week, they have been charged a mines drainage rate of 3996l., and notwithstanding that heavy tax the collieries appear to have just held their own. The directors were now, however, he continued, looking forward a little more hopefully than a year ago consequent upon the anticipated reduction of drainage rates.

## TRADE OF THE TYNE AND WEAR.

Aug. 28.—There is not much change to note in the state of the Coal and Coke Trades here. There is still a good demand for best steam and gas descriptions, but the hot weather has had some effect on the local household coal trade, though there is still a fair demand for London and the Coast. The Shipping Trade, on the whole, is improving; there is more employment for ships, but as so many have been laid up for some time tonnage can soon be had when required, and this prevents any regular advance in freights. Great improvements have, however, been made in the management of shipping companies. The cost of management, and also the cost of insurance, has been greatly reduced, and, on the whole, there is now a better prospect. There is no improvement to report in the Iron Shipbuilding Trade. There is a great dearth of new orders, and in consequence the operatives in the shipyards are suffering severely.

SALT BEDS AT MIDDLESBROUGH.—A new company has been lately formed to work these beds, on the Havaton Hill estate—Messrs. Gregg and Co., of London. The company have leased a tract of ground there for erecting saltworks, and operations are expected to be commenced in a few days. If the firm succeed in finding the salt bed they intend to enter upon the manufacture of the various products which have their basis in salt. The Newcastle Chemical Company, who were somewhat unfortunate in their borings near Havaton Hill last year, have commenced operations on the estate some distance to the east, and the boring has proceeded to the depth of 60 ft. The salt is expected to be reached at 1100 ft. from the surface. Mr. Vivian, of Whitehaven, has the contract for boring in both instances.

The Iron Trade has continued very flat. Makers are, however, pretty well sold for this month, and they still adhere rigidly to the combination price—37s. for No. 3 pig-iron. Forge iron is 34s. 6d. The shipments for the week of pig-iron from Middlesbrough were 17,645 tons, and for the month 53,160 tons. In July the deliveries were 52,269 tons. The mills and forges have done very little this week, owing partly to the Royal visit. The manufactured iron trade is very dull. There is not much change in prices, but they certainly are weaker; less than '54 has been taken for ship-plates. The locomotive and general engineering works are very fairly employed, and also bridge building and wagon works, &c. Ordinary steelworks are generally dull at present. The great steelworks at Eston, belonging to Bolckow, Vaughan, and Co., Middlesbrough, have been closed some time, but they will not be long idle. Alterations are now in progress which will enable this enterprising company to manufacture steel plates on a large scale. The use of steel plates for ship-building instead of iron plates is pretty certain to be largely extended. Indeed there is little doubt that ultimately steel plates will supersede iron plates for those purposes. It has been clearly shown that steel is much superior to iron for this purpose; when a vessel constructed of iron strikes upon a rock the result is generally that the plate is holed, and the vessel lost, while steel plates admit of bulging without holing. The Conssett Iron Company, in West Durham, have led the way here in the manufacture of steel plates; they commenced this make some time ago, and at present are turning out a large quantity of steel plates suitable for boiler-building, ship-building, and many other purposes, for which iron was formerly used.

The visit of the Prince of Wales and the Princess of Wales and family has caused much enthusiasm in this district, and neither trouble nor expense has been spared in giving them a hearty and proper reception. It was certainly very fortunate that such a convenient and picturesque place as Craggside, the residence of Sir Wm. Armstrong, was at their disposal, and they have also had an opportunity of seeing other fine scenes—the Armstrong Park, Jesmond Dene, the River Tyne from Newcastle Bridges, the mouth of the Tyne, the piers, and the fine remains of Tynemouth Priory, the Tynemouth Castle, and the ancient and beautiful village of Tynemouth. As we anticipated, the procession of steamers from Newcastle to the Albert Edward Dock and the mouth of the Tyne was the most imposing scene of the occasion. This dock was projected many years ago, but the project was met with great and powerful opposition. It was strongly opposed by some of the leading men here, amongst them being one, who may be considered an authority, Sir George Elliot, the grounds of his opposition were mainly the assumed

probable early exhaustion of the Northumberland steam coal field. The anticipations respecting the early exhaustion of this field we think will not be realised, as there does not appear to be any reason to doubt that a large area of this coal will be got from the field lying underneath the North Sea. This great tract of coal has as yet been scarcely touched, but the explorations made from the shafts of the Cambols Colliery appear to encourage this view, and in addition to the coal that may be expected to be got in that direction there is a large field of coal in North-West Northumberland in the limestone formation which has been little explored, but there is little doubt that a large quantity of coal will also be found in that district.

The new coal winning at Marsden is on the south side of the Tyne, but it is finely situated for exploring and working the sea coal, and the result of the explorations here will have an important bearing on this question. They will, indeed, go far to settle the question, as the position is about central between Ryhope and Cambols, and at both these latter points it has been proved that the coal beds under the sea can be safely and profitably worked. But the success of this dock is not entirely depending upon the export coal trade. It has been constructed with the view of largely increasing the import trade, and for this purpose a greater depth of water has been provided than we find in any other dock on the river. We give below some statistics showing the progress of the export and import trade of the Tyne.

The staple export is, of course, of coal, and in this article it exceeds the exports from any other port in the world. A century ago the export of coal was about 1,000,000 tons per annum, and the quantity steadily increased. In 1851 it reached 3,500,000 tons, and over 6,000,000 in 1871, and the enormous quantity of over 10,000,000 tons was reached in 1883. The imports in 1883 amounted to 1,700,000 tons, and with the opening of the Albert Edward Dock it is expected that the import trade, which now partakes of a local nature, will soon assume a national character. Many of the branches of the import trade are yet in their infancy, and some of them have developed wonderfully in the past 20 years. The returns of trade show that the value of the foreign and colonial merchandise imported into the Tyne in 1878 was 6,240,359l. In 1880 it was 8,505,168l., and in 1882 9,028,925l. The great increase in the value of exports other than coal and coke is shown by the following figures—1870, 2,263,627l.; 1880, 5,110,457l.; and 1882, 5,337,938l.

## REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

Aug. 28.—As regards the production of lead ore for the year 1883, as compared with that of the previous year, there has been a serious falling off in this district. Cardigan shows a decrease of 1058 tons; Carnarvonshire, 289 tons; Flintshire, 1479 tons; Merioneth, 41 tons; Montgomeryshire, 625 tons; while Denbighshire gave an increase of 200 tons, and Shropshire, 1134 tons; the total result being a decrease throughout the whole district of 2338 tons. Copper also shows a decreased production, although not to the same extent. There was a falling off last year, as compared with the year before, in Anglesey, of 2070 tons; in Carnarvon, of 29 tons; and in Cardigan, of 91 tons; or a total decrease of 3120 tons. There has been a slight increase in the production of zinc. Anglesey shows an increased production of 170 tons; Cardigan, of 3 tons; Denbigh, of 836 tons; and Montgomery, of 277 tons; while there has been a decrease in Carnarvon of 485 tons; in Flint, of 117 tons; and in Shropshire, of 109 tons; the net increase amounting to 575 tons.

The production of slates also shows a falling off in value, the production of 1882 being valued at 1,297,835l., and that of 1883 at 1,139,122l. This trade is at present fairly good and the export of slates keeps up; last week there were 17 arrivals of ships and 19 departures. A heavy fall of rock took place at the Welsh Slate Quarry, Festiniog, last week, by which Thomas Morton, a married man with three children, was killed. It is not expected that any change in the price of slates will be made before the end of the year. A misunderstanding has arisen at the Maenoffern Quarry with regard to the standard by which the wages are regulated; but it is hoped that the matter is now in a fair way of being settled. Several changes in the management of the Festiniog quarries are anticipated.

The efforts made to get the water out of the Mostyn Colliery have failed, as also have the endeavours of the divers to find the body of the pitman, Edward Williams, who was blown out of the cage whilst endeavouring to get the pumps to work after the flooding had taken place. All hope of clearing the pit of water has been abandoned and efforts are now directed to the working of the Eytan shaft; but so far not enough of coal has been obtained to keep the ironworks going. Among the colliers of Denbighshire this is a gala week. On Saturday the annual trip of the Union took place, this year to Bangor. This week there are festivities everywhere on account of the marriage of the only daughter of Sir Watkin Williams Wynn to her cousin, who is the heir to the vast estates of the popular baronet. A serious fall of rock took place on Thursday at the Afonwen Limestone Quarry, between Mold and Denbigh. About 200 tons of rock fell down, burying two men who were killed by the fall.

The rejection of the Manchester Ship Canal Bill has led to much enthusiasm locally, in the way of suggesting other routes, and in the determination to have a canal. Several surveys are being carried on with the view of getting across to the Dee. There cannot, however, be any doubt that the Mersey is the natural outlet for the canal. The Bala and Festiniog Railway Company have decided to create 5 per cent. preference shares to the amount of 50,000l., and also 16,000l. debenture capital. The Wirral Railway Company has also been registered, with a capital of 600,000l., to connect and extend several railways between Birkenhead and the River Dee, with the view of completing the connection with Liverpool by means of the Tunnel to Wrexham and eastwards. The works and plant of the Bagillt Zinc Smelting Company have been transferred to a limited company, with a capital of 30,000l.

## TRADE IN SOUTH WALES.

Aug. 28.—The amount of coal sent away from Cardiff in the aggregate last week was 124,575 tons, was 3490 tons patent fuel. Newport, 28,693 tons foreign, and 21,932 tons coastwise; Swansea, 24,088 tons foreign, and about 14,000 coastwise, with 8121 tons patent fuel. House coal is in slack demand, but prices are hardening.

The strike of Messrs. Cory's colliers at Gelli and Tynybedw continues. When the men to the number of 1600 came out they were quickly absorbed by other collieries with a few exceptions, and those are the provident ones, who can wait in patience for the settlement of the dispute.

The Nine-foot seam has been struck in the Storehouse shaft at the Dinas Colliery. During the first half of 1884 the Forest of Dean coal proprietors sold 367,634 tons of coal, which is an improvement of 64,782 tons over the corresponding period of 1883. Nearly all of this was house coal.

The Iron and Steel Trades of the district remain in a deplorable condition. Newport sent away last week only 859 tons, and Cardiff 10 tons. Iron ore freights have risen 6d. per ton, in consequence of the Spanish quarantine regulations. Newport received last week 10,493 tons from Bilbao, and 800 tons pyrites from Huella. Cardiff received 1800 tons from Bilbao, and 3760 tons from other places.

The Tin-Plate Trade remains in a fairly active condition, and prices tend upwards. Good 10 cokes fetch from 15s. 3d. to 15s. 9d. per box, and chracons about 2s. more; steel with charcoal finish from 19s. 3d. to 19s. 6d.

SWANSEA IMPORTS.—Iron ore, 2320 tons; pig-iron, 2360 tons; copper ore, 3608 tons; silver ore, 59 tons; calamine, 961 tons; zinc ore, 630 tons; lead ore, 885 tons; metalline, 148 tons.

HOLLOWAY'S PILLS AND OINTMENT.—Bilious affections, with all their concomitant annoyances induced by atmospheric changes, or too liberal diet, should be checked at once, or serious consequences may ensue. When anyone finds his ideas less clear than usual, his eyesight dimmed, and his head dizzy, and accompanied by a disinclination for all exertion, physical or mental, he may be quite sure that he is in immediate need of some alternative medicine. Let him at once send for a box of Holloway's pills, a mild course of which will remove the symptoms, and speedily renew his usual healthful feeling. If the bowels be irritable Holloway's ointment should be diligently rubbed over the stomach and liver every night and morning.



## THE RESOURCES OF PORTUGAL.

In 1379 the Portuguese floating debt amounted to 3,124,404; and although a loan of 1,182,000 was raised in that year, and a further loan of 4,175,544 in 1880, making a total addition to the consolidated debt of 5,299,544, yet by June 30, 1883, the floating debt had risen again to 2,396,950. At the end of that year a further loan was contracted, which added 908,666 more to the consolidated debt; but, nevertheless, on Jan. 31 last the floating debt, with its wonted elasticity, stood at no less than 2,988,910; and a fresh funding operation is once more to be carried out during the present year, for which purpose the Finance Minister seeks authority to contract another loan for 4,000,000 sterling. Many years' experience of this country leads me, says Consul Brackenbury, to the belief that it possesses considerable resources, which are still undeveloped. Much, the greater portion indeed, of the money which has been raised on credit has been applied to material improvements of an important character, and the wealth and revenue of the country have increased enormously in consequence. Still the debt is increasing with such great and rapid strides that I cannot but think it behoves any well-wisher of this country to sound a note of warning. On the present system, and with the fatal facilities which exist for meeting every financial difficulty by borrowing, it is useless to anticipate an era when the ominous word "deficit" shall disappear from Portuguese budgets. On the other hand, unless the difficulty be firmly grappled with, and the revenue and expenditure made to balance, it is not hard to foresee that, despite honest intentions and praiseworthy attempts, disasters, such as have characterised the finance of the sister kingdom more than once within living memory, can scarcely be averted in Portugal.

A general idea of the system of taxation in Portugal may be obtained from the following statement. Taxes in Portugal are divided into four main groups:—1. Direct taxes.—2. Stamps and registration fees.—3. Indirect taxes.—4. Rents of property in the possession of the State, &c. To these must be added an "additional tax" of 6 per cent. levied on the amount of certain of the above taxes; and the balance of the revenue is made up by sundry repayments, which, of course, are not taxes, properly so called. Stamp duties and registration fees are treated by Portuguese financiers as an intermediate class between direct and indirect taxes; and it is to these two latter groups, as being by far the most important, that this necessarily brief notice will be confined.

The principal direct taxes in Portugal are—the property, industrial, house rent, and sumptuary taxes, and an income tax on official salaries and dividends. The undermentioned less important taxes are also considered as coming properly under this head—a tax on the interest of loans, the fees on conferring titles, decorations, &c., the duties on mines, fees levied by Government officers, and certain other dues and fines. Real property is taxed on the basis of income. Proprietors of houses (house property in Portugal is generally either freehold, or held at a quit rent for ever; the 99 years' leases common in England are practically unknown there) must make declaration of the rents received by them, and the same course is pursued in respect of farming lands. The tax is levied, in the case of houses, upon the actual rent paid; in the case of lands, upon the annual value of the produce, less a deduction for the expenses of cultivation, varying from 40 to 60 per cent., according to the description of the culture; but so that the taxable value shall never be inferior to the rent of the holding, nor to the quit rents, and other similar charges upon it.

The aggregate of annual taxes upon real property amounts at present to about 13 per cent. on the taxable income (rendimento collectable); but as soon as the revision of the official registers which is now in progress shall show a net taxable income, amounting to, in round numbers, 7,000,000 sterling, the contingent of the tax is thenceforth to be fixed invariably at exactly 10 per cent. on such taxable income, which, it is estimated, will, when the revision is completed, be considerably above 7,000,000, which sum, it may be remarked in passing, is as nearly as possible identical with that at which the total revenue of Portugal is estimated for the next financial year.

For the purposes of the industrial tax, and of some other taxes, the kingdom is divided into six different classes of towns, and the various trades and industries into eight separate categories. The annual tax levied is a lump sum upon each person or firm in the different classes and categories named. But this lump sum is further increased by various percentages which have from time to time been superadded to the original tax, of which the main are—40 per cent. levied nominally for the maintenance of roads (imposto de viacao) and 6 per cent. (the additional tax above referred to); with, moreover, a 2 per cent. stamp duty on the receipt or quittance given to the contributor on payment of the tax. These two last percentages I ought already to have observed, are also levied upon and added to the property tax. But the full weight and incidence of the tax are not even thus arrived at. The normal sums are the minima leviable in such category and class, but the Finance Minister in estimating the revenue of the coming year always fixes for each district the quota of this tax at an amount far exceeding the total or aggregate of all such minima within the district. This excess, therefore, has to be recovered by the tax collectors, and its amount is distributed in the following manner:—As every trade or industry is composed of tradesmen, manufacturers, &c., doing more or less business, it is enacted that all persons included in the same category shall form amongst themselves a board (gremio) consisting of a president and two secretaries to be charged with the duty of dividing among the respective members the amount of tax levied by Government over and above the total of the minima in each category. For example, the minimum amount levied upon each individual of the first category in a first-class town must be equal to an annual sum of 200 milreis (the normal sum of the table), plus such portion of the excess levied upon the district as the gremio may consider equitable, so that the wealthier dealers or tradesmen may bear their proper proportion of such excess.

The taxation in Portugal in its multiplied form bears heavily upon every material interest, and levies a large contribution upon the wealth and industry of the kingdom. Complaints are made that there are irregularities and partiality in the levies, and that favoured individuals, who are supposed to wield influence in political affairs, are permitted either to under-estimate the taxable income of their estates, or, in the cities and towns, to get classed in the lower categories of industries, in order to escape themselves and shift upon others a great portion of the load it is their legal and equitable obligation to carry. At the present moment, moreover, as already stated, a revision is being carried out of the various kinds of real property subject to the property tax, with a result, so far as it has gone, of showing an increase of 40 per cent. in the value of the property liable to taxation. In regard to method, it is claimed by Portuguese financiers that the system of taxing rents or the income of real property is fairer than to assess the capital value of such property, and to base taxation upon such an assessment without reference to the income the property may yield. Unoccupied houses are not taxed in Portugal, the theory being that the use of a thing defines the measure of its value, and that to tax unused property is a step in the direction of confiscation. In reply it may be said that the moderate taxation of unoccupied property increases the effort to secure occupation, and discourages the disposition to hold premises tenanted and lands undeveloped pending the acceptance of demands for an unreasonable rental.

There may, perhaps, be some force in this argument as applied to landed estates, especially in countries where there exists a large tenant class anxious to secure the use of land whenever opportunity offers at a rent enabling them to work out even the humblest living. A serious objection to the Portuguese fiscal system arises from the complicated and vexatious character (above noticed) of the customs tariff, which is divided into no less than 815 separate heads, and which is still of a virtually prohibitive character as regards many descriptions of goods, not a few of which are scarcely, if at all, produced in this country, where the agriculturists are to the manufacturing and artisan class in a proportion of probably not less than eight to one. The worst characteristic of all, how-

ever, as regards this system is the fact that the main incidence of taxation in Portugal is on the lower classes, whose food and other primary necessities are weighted (especially in the capital) with a load of taxation which, to an Englishman, is in striking and painful contrast to the almost complete exemption enjoyed by the working classes in his own more favoured country.

## MINING IN DERBYSHIRE UNDER THE DERBYSHIRE MINING CUSTOMS AND MINERAL COURTS ACT OF 1854.

No. III.—By W. NIXESS, M.E.

Clause XVIII.—makes it lawful for the Queen to appoint a barmaster for the soke and wapentake of Wirksworth, and to be called barmaster of the said soke and wapentake, such barmaster power to appoint a deputy barmaster.

Clause XIX.—Lawful for the several persons hereby authorised to appoint stewards for the said manors and liberties (excepting orich), such barmasters (with the consent of the person under whom he holds his appointment) nominate deputy barmasters.

Clause XXI.—Barmasters to be well and truly sworn to serve the office to which they are appointed, or such appointment to be void.

Clause XXII.—Duties of barmaster to execute such precepts and warrants as shall be directed to him, and signed by the steward and sealed with the said seal, to attend on views with the steward and deputy barmaster of the district in which the mine to be viewed is situated, and, where there is no deputy appointed to perform all the duties of the office, until a deputy is appointed.

Clause XXIII.—Duties of Deputy Barmaster: To serve summonses in actions in the small barmote courts of their respective districts, to serve summonses on jurors, to attend views on mines within their respective districts, collect the dues payable within their districts, keep accounts of such dues, keep a book, and make therein written entries and particulars of all meers of ground which shall be measured and set out by them; also of all transfers of mines; also all freings, gifts, and other matters connected with the mines within their respective districts; to sign in such book and to deliver the same half-yearly, together with a fair copy of the aforesaid accounts, to end with the 25th March or 25th September, to the steward at the great barmote court next after the day to which such accounts shall be made up, or with the consent of the steward at any adjournment of the said court, or at any subsequent great barmote court, to produce any such book, to make and deliver other fair copies of the aforesaid accounts at any time upon demand being made by the steward for the production of any such book or for any such copy, and to perform all such duties within their respective districts as are in this Act mentioned as forming part of the duties or business of the barmaster.

The barmaster is the chief acting official under the Act, and the officer with whom the miner directly has to deal with. The term barmaster is a corruption of A. S. berg—i.e., mountain or mine, and meister—i.e., master or superintendent. It has undergone many changes, having at different times been called barghmaster, barmen, berghmayster, bannaster, berghmaster, &c. The last term is most free from corruption. "Anciently the barmaster was chosen and elected by the free suffrages of a majority of all the miners, which election was confirmed by the King; afterwards the King for the time being claimed and exercised the nomination of that office, and the lords of the several manors, following the regal example, ultimately succeeded in effectually depriving the miners of their clear and undisputed right of election. The office of barmaster was formerly that of mineral coroner, and superior to that of the steward."—(Tapping.) Houghton, who wrote in 1680, in reference to the election of barmaster, states that—"The miners and merchants at first chose themselves an officer, called a barmaster, to be an indifferent person betwixt the lord of the field, or farmer, and the miners, and betwixt the miners and merchants."

Although it is only reasonable that the miners should participate in the choice or election of a person holding such an important office, and with whom they are so closely allied in their pursuit, the present barmasters are popular with the miners of their several districts, through carrying out their duties in an impartial manner; and on the whole the election of barmasters by those persons empowered by the Act to do so gives satisfaction. From a perusal of the chief duties of barmaster, it will be seen that his is an office of great trust and confidence. Although his position is inferior to that of the steward he has very important duties to perform independent of a jury.

Clause XXVII.—As to the practice of courts. The steward has in any case power to grant time to adjourn any great or small barmote court. The wives of parties shall be competent witnesses, and compellable to give evidence.

Clause XXVIII.—Persons giving false evidence in any examination upon oath, or solemn affirmation, before the steward shall be guilty of perjury, and liable to be indicted and subject to the same punishments as persons guilty of a similar act in any of the superior courts of Westminster.

Clause XXIX and XXX.—Penalty for refusing to give evidence not exceeding 10s., and for insulting steward or barmaster not exceeding 5s.

Clause XXXI.—Grand jury of the said soke and wapentake, and the grand juries for the united liberty of Ashford, Tideswell, Peak Forest, and Hartington, and for that of Stoney Middleton and Eyam to respectively consist of 12 men, to be selected by the barmaster from amongst persons resident or working within the respective jurisdictions of the said great and small barmote courts, such jurymen to be experienced in practical mining, members of the grand juries to be sworn in by the steward.

Clause XXXII.—Duties of grand jury to attend barmote courts, and at any other time, after 24 hours' notice, upon the summons of the barmaster.

Clause XXXIII.—Practice of small barmote courts, steward upon the entering of any plaint, cause, or summons, to be issued, and within one month after the entering of plaint hold a small barmote court for the trial of the cause, upon which the steward shall proceed to try the cause, leaving all matters of such issue in the cause to be determined by the jury sworn for the trial, shall give judgment, the judgment of the court to be enforced by a warrant to be issued under the hand of the steward and the seal of the barmote court, the defendant to be allowed to give evidence of any special matter of defence.

Clause XXXIV. to XXXIX.—Affecting trials. Summonses to be served upon the defendant 14 clear days at least before the day appointed for the trial. If defendant do not appear to proceed to trial, and if the steward thinks that he is entitled to recover, he shall have judgment.

Steward may grant new trials and set aside judgment and other proceedings, and may stay proceedings, and in so doing he is directed to as far as may be on the same principles as are acted upon in similar cases by the superior courts in Westminster. The party who has judgment in his favour entitled to recover his cost of suits or defence as the case may be.

Lawful for the Court of Queen's Bench at Westminster or for any judge of any of the superior courts of Westminster, or application of plaintiff or defendant in an action in any small barmote court, before or after trial, on cause shown by affidavit satisfying such court or judge that an impartial or satisfactory trial cannot be or has not been had in such barmote courts, or for any other cause which shall seem reasonable, to allow a *certiorari* to be issued out of the said Court of Queen's Bench for removing all proceedings which may have been in such action into the said Court of Queen's Bench, when a cause is so removed, the pleadings in the court below shall stand, and need not be repealed in the Queen's Bench, and shall be of the same effect there as in the court below; and if the pleadings are not complete in the court below the same pleadings shall be adopted, and with the like effect in the Queen's Bench as might have been adopted in the court below.

In reference to any cause the miner has every facility afforded him by the provisions of the Act to have a fair and impartial hearing, and he is not bound hand and foot to the ruling of the barmote courts if he is not content therewith.

## RAILWAY ENTERPRISE IN GUATEMALA.

The opening of the railway from Champerico to Retalhuleu, a distance of about 30 miles, has developed a district highly productive in coffee and sugar; and, independently of the valuable concessions in money, and a grant of land covering over 63,000 acres, situated on the banks of the River Sarstoon on the southern border of British Honduras, secured by the American Constructing Company from the Government, the line will, in Consul Bennett's opinion, no doubt, pay well. The railway in course of construction from the port of San José to the capital is progressing rapidly. Numberless difficulties have been encountered by the engineers, amongst which may be mentioned numerous bridges over "barrancos" (deep and wide fissures of volcanic origin), the enormous quantity of water accumulating suddenly in the rainy season, the unhealthiness of the lower parts of the line near the coast, the building of an embankment across the lake of Amatitlan—which is certainly an old crater, and which, according to Indian tradition, was bottomless—and a rise of 5000 ft. from the sea to the capital, a distance of about 80 miles, 4000 ft. of which are to be surmounted in the last 50 miles.

The road is practically finished for three-quarters of the distance, and by September, 1884, at the latest, unless some unforeseen accident occurs, the train will reach the capital, enabling passengers and merchandise to reach the port in three or four hours, instead of 10 days at present, by diligence or ox cart, in any time from 12 hours to 10 days. There are no other railways in the Republic either open or in course of construction, but a project for a railway from Santo Tomé to Guatemala is being actively prosecuted by the Government. It is proposed to build this railway entirely by a national forced and voluntary subscription. Everybody is at liberty to buy shares, and natives who do not do so voluntarily become shareholders by compulsion, under an income tax law which came into force on Jan. 1, 1884. The cost of the line is estimated at \$12,000,000, which are to be raised by forced and voluntary subscriptions during the 10 years required for the construction of the railway. Preliminary work have already commenced.

The telegraph system of Guatemala is carried on in 70 receiving offices, and over 2880 miles of wire. The service is efficient, and the rates of charge for land telegrams are reasonable. Telegrams from abroad travel by cable to the city of San Salvador, whence they are sent on here, and the extra land charges collected on delivery. According to official returns there were on Dec. 31, 1883, 831 Government elementary schools open; 38,339 children were in daily attendance, and 1023 Government professors were engaged in tuition. The great attention shown by the Government to public instruction is one of the most hopeful signs for the future of Guatemala. The children, even Indians, in the smallest and most remote villages are compelled to attend school, where they learn at least to read and write, and are grounded in general knowledge.

Guatemala is essentially an agricultural country, and the climate found at different altitudes, varying from tropical heat to frost, allows of the cultivation of northern and southern cereals, plants, and trees; but the means of communication are generally so defective, and carriage so expensive, that vast regions of highly productive land are lying uncultivated, simply because it would not pay to till them and send away the crop, or because labour is scarce and uncertain. The country is rich in textile plants, cotton, ramie (Chinese grass), henquen pito, escobilla, hemp, and numerous others; the native Indians are fairly skilled workers in cloth and woollen goods—somewhat Oriental in character—and yet with both the material, the skill, and the labour on the ground, empty coffee sacks, to the value of \$40,000, are annually sent to this Republic alone, mostly from Dundee. Ramie especially grows well with an exceedingly long silky fibre quite 24 in. in length, and in certain districts will produce four crops a year. It is not, however, cultivated, or gathered, and remains only an unit in the long list of Guatemalan agricultural products which are waiting for the master hand to turn their riches to account.

WIRE TRIANGULAR TRUSS.—The paper "On the Wire Triangular Truss, and its application to Elevated Railroads, Rigid Suspension Bridges, Roofs, Aqueducts, Viaducts, and other Structures," read before the Franklin Institute by Mr. CHARLES J. QUETIL, C.E., M.E., has been reprinted in separate form. The author claims that the truss which has been invented and patented by him for permanent loads dispenses entirely with horizontal strains on the chords, and allows to support a moving weight with lighter material than is generally done. It is made with steel wires isolated and united together in a form of cable or rope. I would recommend its application to different kind of structures, such as elevated railroads, bridges, roofs, viaducts, aqueducts, and others. To give you a general idea of the truss, he would say, take 1 in. board, and draw on it a rectangle 10 in. long and 5 in. high. Call the four corners A, B, C, D, and at each of them drive a small wood screw. At the top screws A and B fasten the two ends of a wire, No. 20, of such a length that pressing it with the finger it deflects a little less than 2 in. Pull on the centre of it with a spring balance, and when the deflection is 2 in. note the number of pounds indicated. Suppose it to be 8 lbs. Fasten to the bottom screws C and D the two ends of another wire of same length as the first, and with a third wire brace them together so that the deflection of each be 2 in. You have now a truss almost rigid for any pull or weight coming on it less than 8 lbs. If there is any deflection it will be so much below the quantity allowed in good construction, which is the 1-1500 of the span, that practically it will not amount to anything. I can, he continues, increase considerably the rigidity of the truss with a wire having its ends fastened in A and B, and passing under wire C, E, D, supporting the apex E, and resisting its deflection when the load comes on the centre of the span. Let us suppose now the fixed points to be bolts put through posts, the posts 10 ft. apart from centre to centre, and the deflection of the wire 2 ft. Suppose a whole line of posts put 10 ft. apart from centre to centre, and supporting one line or two parallel lines of light iron or steel rails, or of T iron, the centre of those rails or T iron acting as such, being supported in the centre of the span of 10 ft. by the rigid truss, and you will have an idea of my elevated railroad. Half of the weight carried on the span by those rails will go on their centre, and by means of short vertical posts will come on the truss. In my railroad the span of 10 ft. affords room for two small cars 4 ft. long each, and consequently the weight coming on the centre of the rail, and which has to be supported by the truss, is the weight of one car loaded. If the top wires, by means of an iron rod and nuts, have been braced in advance with the bottom wires, to a rigidity equal to the one they would get with the weight of one loaded car suspended to them, they will be kept to that rigidity or tension by the lower wires having the same tension with the same deflection, and when the weight of the loaded car will come on the centre of the rail, the effort causing that rail to deflect will be only half of that weight, because as soon as the loaded car presses on the top wires of the truss the bottom wires are relieved and have a tendency to contract, their action on the top wires ceasing. Between those two actions, the weight pressing on them from the top and the lower wires ceasing to press on them, the top wires will deflect half the quantity they would if there was no truss and the loaded car was suspended to them. Consequently, if in moderate weather, at a temperature, I suppose of 45° Fahrenheit, the trusses have the required rigidity for not deflecting more than 1-1500th of the span, or 0.08 in., when the weight of one loaded car comes on them, it is only at an elevated temperature of 120° Fahr., for example, that the deflection may increase in a way worthy to be observed and attended to.

MAP OF NEW SOUTH WALES.—With a view to afford intending immigrants and those unacquainted with the colony an idea of its real character and resources a handsome chromo-lithographed and illustrated map of New South Wales has just been issued from the Colonial Secretary's Office, Sydney. It has been designed and compiled by Mr. Critchett Walker, Principal Under-Secretary, with the assistance of Mr. John Plummer, the artistic portion being the work of Mr. John McLeod, and the printing by Mr. Thomas Richards, the Government printer. The map is admirably printed, and the information given is ample and interesting.



## THE MINERAL VEINS OF THE LAKE DISTRICT.—No. I.

The highly interesting paper on this subject recently read before the Manchester Geological Society by Mr. J. D. KENDALL, C.E., has now been printed. It is not a little remarkable, says the author, that although mining is said to have been conducted in this district since the time of the Romans, so little information exists regarding the nature of the deposits that have been worked. A few scattered pages in the history of the mining operations are to be met with in some antecedent publications, but there is almost nothing recorded as yet of a geological character. Even in the excellent memoir by the late Mr. Ward, which professes to give the principal results of the geological survey of an important part of this district, the mineral veins are dismissed with little more than a brief notice of their direction and "hade." Mr. Postlethwaite's interesting work on Mines and Mining in the Lake District, after noticing the principal rock formations and the various minerals found in the mines, is confined almost entirely to a history of the mining operations. Questions of a geological nature seem to have been avoided, generally, in the past. This was probably in part on account of the extreme difficulty of answering such questions, but mainly no doubt it was a consequence of that remarkable indifference or neglect which, prior to the last seven or eight years, seems, in this district, to have characterised the treatment of almost every branch of scientific enquiry.

With regard to geological distribution, Mr. Kendall states that most of the mineral veins hitherto worked occur in the lower silurians and in the granitic and granitoid rocks associated with them. Mineral veins have, however, been met with in the upper silurians, but they are rare, and so far as yet proved, not of very great economic importance. In the Coniston grits and flags, about midway between Staveley and Kentmere, a lead mine was worked for several years, and a considerable amount of work done, but the results were not satisfactory. Other trials were made between Winster and Crook, in the Bannisdale slates, and a small quantity of galena was obtained, but not sufficient to induce the adventurers to continue their work. Explorations on a small scale have also been conducted in other parts of the upper silurian area, but the results were equally discouraging.

In the lower silurians and their associated rocks, veins are numerous, and some of them have yielded large quantities of minerals. In the Borrowdale rocks there are the famous copper mines of Coniston, and the equally important lead mines at Greenside, besides a large number of veins of both lead and copper in other parts of the district, many of which have not been worked at all, and others only partially. Veins of hematite are abundant in these rocks, but very few of them have been explored on account of their great distance from the railways. The most extensive workings have been at Tongue Gill, near Grasmere, and at Dunderdale, in the Wharfedale valley. It is in these rocks that the Borrowdale graphite is met with. In the Skiddaw slates veins of both lead and copper occur. Among the mines in which the ores of the former metal were worked, it will suffice to mention Loweswater, Goldscope, Yewthwaite, Barrow, Brandlehow, Force Crag, Thornthwaite, and Woodhead. Some of these mines, as previously mentioned, worked ores of lead as well. The principal copper mines in the Skiddaw slates are at Goldscope and Dalehead, but there are several other copper veins in these rocks, some of which have not been proved, whilst others have been worked but slightly. Hematite has been worked very extensively in these rocks for a number of years, at Knockmorton and Kelton Fell, and these are almost the only places where any serious attempt has been made to find it.

Veins of manganese ores also occur in these rocks, but they have not yet been worked, except in the most trifling way. In the Eskdale granite and the Ennerdale syenitic granite, the only veins that have been much worked are those of hematite. In the former rock this ore has been obtained in Eskdale, on both sides of the valley opposite Boot, and also near the King of Prussia. It has also been worked near Bootle. In the latter rock several veins have been worked, in a small way, near Ennerdale Lake, and it is now proposed to make a railway to them. In the hyperthenite and its associated rocks, of Carrock Fell and neighbourhood, both lead and copper veins have been worked, notably at the mines of Roughton Gill, Silver Gill, &c. There does not appear to be a single instance in the district of the same vein having been worked in the granitic or granitoid rocks, and in the sedimentary or volcanic rocks surrounding them. Veins occur between different kinds of rocks, as in Clews Gill, Ennerdale, where a vein of hematite has been partially worked with Skiddaw slate on one side of it, and syenitic granite on the other. There are several other "contact" veins in that neighbourhood, but they have not yet been worked.

In connection with the reciprocal influence of veins and their enclosing rocks, it is a very curious and important fact that the chemical composition of a rock immediately adjoining a mineral vein is in many instances, and it may be in all, different from that of the same rock only 2 or 3 ft. away from the vein. This statement will be rendered clearer by the following analyses of mica schist, adjoining a manganese vein in Wiley Gill, to the north of Skiddaw. No. 1 shows the composition of the rock close to the vein, No. 2 that of rock about 3 ft. away. Analyses of the wall rock of a vein gave No. 1—Silica, 64.56; alumina, 22.72; lime, 0.20; magnesia, 0.30; alkalies, &c., 6.58; peroxide of iron, 2.90; water combined, 2.74 = 100. No. 2—Silica, 52.23; alumina, 25.25; lime, 0.22; magnesia, 1.74; alkalies, &c., 9.09; peroxide of iron, 7.05; water combined, 4.42 = 100. Specific gravity, 2.62. In the rock immediately adjoining the vein (No. 1) there is an increase of silica, and a diminution of all the other elements, as compared with the normal composition (No. 2). In some places the walls of a vein are softer than usual and quite decomposed, and, almost invariably, where this is so, the vein is extra wide. On the other hand, where a vein is narrower than usual, it is almost certainly found that the walls are extra hard. In some mines it is considered a good indication when the walls become softer.

The veins hitherto worked in the Skiddaw slates are confined to the argillaceous beds of those rocks, whilst those in the Borrowdale series seem to prefer the ash rocks; but the reason of this may well be that the greater hardness of the sandstones and grits of the Skiddaw slates, and of the lavas of the Borrowdale series, has prevented veins which are known to exist in those rocks from being worked, for it is certain, other things being equal, that a miner will always prefer a soft country rock to a hard one. The hematite veins in the hard granitic and granitoid rocks do not appear, generally speaking, to be so wide as in the softer Skiddaw slate. The widest hematite vein yet found is the latter rock at Kelton Fell.

As to the age and origin of the veins, Mr. Kendall remarks that this part of the subject being necessarily of a conjectural and argumentative character it might have been advantageous to have examined the conclusions arrived at by others before indicating those that seem to be deducible from the foregoing facts. But, unfortunately, such opinions have not been recorded for this particular district. As, however, there is no great difference between the mineral veins of the Lake district and those of other areas, it may not be amiss to consider for a while some of the more important opinions held by writers on the theory of mineral veins in general, so as to see how far such so-called theory succeeds or fails in explaining the facts hereinbefore described. The general opinion hitherto held seems to have been that mineral veins are filled fissures. This was the opinion of Opper (about 1750), Pryce (1778), Werner (1791), Carne (1822), De la Beche (1853), and of a number of other writers at intermediate dates, whilst the same idea is set forth in Geikie's recent (1882) Text Book of Geology. The varying width of veins has been attributed generally to the sliding of the sides thereof upon one another.

Von Cotta, in his Treatise on Ore Deposits, says that veins are aggregations of mineral matter in fissures of rocks, and, with reference to the breadth of veins, the breadth of each separate lode is frequently very variable in different portions. This dissimilarity is a consequence of slides, which the enclosing walls of the fissure have undergone, whereby every deviation of the fissure from a plane would cause a widening or narrowing of the same. Geikie, again, in his Text Book of Geology, states that a mineral vein consists of

one or more minerals deposited within a fissure of the earth's crust. Considerable variations in breadth may be traced in the same vein. These may be accounted for either as due to unequal solution and removal of the walls of a fissure, as in the action of permeating water upon a calcareous rock; or to the irregular opening of a rent, or to a shift of the walls of a sinuous or irregularly defined fissure.

In taking a general view of mineral veins one of the first objections to the foregoing explanations that must rise in the mind of every miner is the impossibility, so far as his experience goes of the walls remaining intact and apart whilst the vein matter was being deposited. This difficulty can only be properly appreciated by those who are acquainted with vein mining, and who, therefore, know the great tendency of vein walls to close together, and also the liability of the hanging-wall to break and fall away. The back of the Goldscope copper vein above the adit was, at one place worked away to "day." This place is known as the Panholes. The breadth of the vein originally worked out, near the surface, would be about 3 ft., and its length about 40 yards, and although this length is a trifle compared with the open spaces there must have been in some veins, if the fissure explanation be correct, yet such has been the effect of the atmosphere and other denuding agents on these wall as the Panholes that large masses of rock have fallen away from the higher part of them and completely blocked up the opening that previously existed below. The fallen pieces of rock being jammed in between the walls have no doubt prevented those walls from falling away as far as they otherwise would have done, but sufficient has already taken place to show that there never could have been a pre-existing fissure where the vein now is. Similar facts may be witnessed in almost any extensive mine that has been abandoned for a few years. The difficulty of keeping the walls apart at Goldscope is referred to by C. Twite in his report to the Commissioners appointed to enquire into the condition of all the mines of Great Britain, wherein he says "the ground is very difficult to keep open after the lode is worked away, requiring heavy timber."

A further objection to the fissure idea is presented by the horses. The planes of lamination in these pieces of rock are always parallel to those of the wall rock. Many of the horses are, moreover, entirely surrounded by veinstone, a position which it is impossible they could have occupied if they had fallen from the hanging-wall of a fissure, for under such circumstances they must have dropped on to the lying wall. Other objections than these might be made.

It would thus appear that there is a very simple and natural way of accounting for the quartz which forms the bulk of the veins of this district, without assuming, what is opposed to all experience, that long, deep, and narrow fissures at one time traversed the rocks in all directions. Sulphuric acid is one of the commonest of volcanic emanations, and, therefore, in all probability, was abundant in the Lake district during the disturbed times previously spoken of, so that it is only necessary to assume that solutions of this acid found their way upward along lines of faulting, or along some of the more powerful joints, and there are present all the conditions required to produce the complicated network of veinstone which forms the basis of most of the mineral veins of this district. The acid solution would rob the rocks adjoining the joints or faults of their alkalies and alumina, &c., and the liberated silica would be redeposited as quartz. One of the first consequences of that operation would be the appearance in the quartz of cavities, equal in volume to that of the materials removed by the acid solution.

## MINERAL WEALTH OF ULWUR STATE, INDIA.

An interesting report upon the iron mines of Rajgurb, the Dariba Copper Mine, and some other iron and copper mines in the same district, has just been made for Lala Sri Ram, M.A., the Prime Minister to H.H. the Maharajah of Ulwur, by Mr. THOS. F. ANDRESEN, M.E. who states that the iron mines of Rajgurb, are situated in a series of rolling hills that commence about 1½ mile from the city, and continue from there on in a direction a few points east of south for a distance of about 1½ mile. These hills have an elevation of from 150 to 300 ft., and form the eastern slope of a ridge of quartzites, which rises considerably above the iron ore, and stretches for several miles to the southward. The surface of the eastward slope of this hill is almost entirely covered with loose pieces of iron ore (hematite), which become more conspicuous towards the summit. The whole hill is covered with long open-cuttings, with shafts of very shallow depth or honey-combed with tunnels; but no ore has for a number of years been extracted from this hill, and these old workings are said to have been abandoned whenever hard blasting rock was encountered, and made it impossible for the miner of the day to proceed further with his very imperfect tools. From the detailed investigation Mr. Andresen has ascertained that this large deposit of iron ore extends in a regular belt for a distance of over 1½ mile in length, and has an average width of over 500 ft.; that it has been followed to a depth of over 120 ft.; that it consists chiefly of rich red and brown hematites, specular iron (an ore producing iron of excellent quality); and that it is notably devoid of the presence of foreign minerals.

At the furnaces in the outskirts of the city the iron is obtained directly from its ores in the malleable state by direct process. The furnaces are very small, and resemble the simplest forms of the old Catalan forge.

The iron produced was of excellent quality, being extremely soft and malleable, and had, when broken, a fine granular structure; but the product was, in comparison with the great quantity of ore and charcoal employed, the length of time required for reducing the ore, and the, on the whole, heavy expenditure, very small. At the town of Tahla, 10 miles from Rajgurb, the party inspected a small "bloomery" in full blast; but it was of the same dimensions as those they had seen in Rajgurb, and the method of charging, &c., was also the same. The ores are mined a few miles from the place, and sold by the miners to the owners of the furnace. The double bellows, which supply the blast to the furnaces, are here worked by women; 10 women are employed at a furnace, each woman working two hours at the bellows, and receiving for her labour two pice. The furnace-men asserted that it required 15 maunds of charcoal to reduce 10 maunds of iron ore; this would be a very heavy expenditure of fuel, and he does not regard this statement as reliable.

The Dariba Copper Mine is situated in a high mountain, just above the town of the same name; it is a true fissure vein, occurring at the junction of the quartzites with the black slates, the copper-bearing stratum being formed between these. The hanging-wall consists of quartzite and the footwall of black slate. The course of the lode is a few points east of south, with an average width of 20 in.; the croppings can be plainly traced for a distance of over ½ mile, and the ledge has a varying dip of from 80° to 50°. The mineral is principally copper pyrites. Traces of the old workings are met with on the summit and slope of the mountain. There is everywhere evidence of copper ores having been extracted from this ledge at an early period, and the large heaps of slag that are yet remaining in the immediate neighbourhood of where centuries ago the furnaces were located seem to indicate that operations to a very considerable extent have at some period been carried on here. Within about 200 ft. of the summit of the mountain are very extensive old workings. The vein matter is everywhere composed of hard blasting rock, but the art of boring holes with steel drills and blasting with powder and fuse is entirely unknown here; the miner contents himself with, in a very laborious and patient manner, chipping fragment after fragment from the ledge—by the aid of a chisel-shaped "gad," about 4 in. in length, and a hand hammer with a very short handle, weighing in all about 2½ lbs. With these imperfect tools his progress must necessarily be exceedingly slow. A small and frail staging is rigged up by bracing a few pieces of wood against the walls; on this the miner spreads a cloth to catch his chippings, while the staging at the same time serves him as a seat. He works on in this place as long as he is able to extract rich ores, but when poorer ores are encountered he soon loses patience, abandons the work, and commences operations in another place where he considers there is promise of his labour being more remunerative. In this way large quantities of rich ores have been extracted from different parts of the tunnel, and the workings extended to a height of 20 ft. and even more above the roof

of this level. No precautions are taken by the miner when he abandons a slope to keep the walls from falling together; and although this level is yet in a tolerably secure state, it bids fair if no timbers are used to be in the course of a few years in as bad and unworkable a condition as the old workings near the summit of the mountain.

The smelting-furnaces are very small, and the scale of operation is very diminutive. Each miner has his own smelting-furnace, and it is generally erected in a small shed near his dwelling; it is round, and built of red clay or small bricks. It is never over 3½ ft. in height, the sides are 6 in. in thickness, and the circular opening at the top has a diameter of 18 in. In front and at the base of the furnace is an arched opening 10 in. in height by 6 in. in width, which is closed by a thick sheet of burnt clay, and withdrawn at the close of the operation. At the base of this arch is an opening, through which the liquid slags are run off, and in the central part of the hearth is a circular cavity, 8 in. in depth by 6 in. in width, where the metal is accumulated during the operation of smelting. Three earthen tuyere pipes are led into the furnace, one directly opposite the arched opening in front, and the two others are inserted half-way between the arched opening in front and the tuyere pipe at the back. The tuyere pipes make an angle with the bottom of the hearth of from 5° to 10°. The blast is supplied by small bellows made from the skins of goats, fitted with bamboo nozzles that are inserted into each tuyere pipe, and worked by hand. The ores when brought to the furnace are broken by hammers into small fragments, and these fragments are then ground to a state of fine sand between two hard stones on a so-called Indian "silbata," of which the lower one is flat and stationary, while the upper one is a mere cylindrical muller, which is by hand continually rolled to and fro over the ores until the desired fineness has been attained.

The ore after being reduced to this necessary state of fine division is now mixed with cow-dung, and rolled into cylindrical shapes of about 3 in. in length by 1 in. in diameter. This mixture when dry undergoes a preliminary roasting by being buried in hot coals, and blown upon until reduced to a cinder. This preliminary roasting—which in fact partakes more of the nature of burning than of roasting—has for its object the expulsion of arsenic, &c., also to eliminate a portion of the sulphur; but, at the same time, to retain a sufficient quantity to form a good coarse metal with the copper and a portion of the iron. Iron slags are used in these furnaces for the reduction of the copper ores in the proportion of one maund of slags to one maund of ore, and these slags are obtained from iron furnaces situated in small towns about 2 miles from here. The materials with which the furnace is to be charged are placed near it; a layer of charcoal 10 in. in thickness is then placed in the bottom of the hearth, then a layer of roasted ore, then a stratum of slag, and so on until the furnace is full. Then fire is applied at the base, the full blast of the three bellows are admitted to the furnace, and it is soon in what is termed full blast. When the layers settle and flame makes its appearance at the top of the furnace fresh charges are added, and alternate layers of fuel, ore, and slag are introduced.

In this way the complete fusion of the mass is effected, the gangue uniting with a certain portion of oxide of iron forms a fusible slag, while the copper in combination with iron, sulphur, &c., yields a liquid regulus, or so-called coarse metal. The slag and the coarse metal flow together into the cavity at the bottom of the furnace, where the latter from its greater density accumulates at the bottom, while the lighter slag floats on its surface out through the opening at the base of the furnace, and is removed about every quarter of an hour. It takes 12 hours to reduce one maund of ore (82 2-7th lbs.) in one of the furnaces, and the amount constitutes a charge. At the close of the operation the thick slab in front of the furnace is taken out, and the coarse metal which has collected at the bottom of the hearth after being allowed to cool is now removed. The coarse metal obtained amounts to from 15 to 20 per cent. of the weight of the copper ore smelted, and never contains more than 35 per cent. of copper: 11 miners are at work in the Dariba Mine, and each man has his own smelting-furnace, but the whole produce of these furnaces is sent to one and the same refining-furnace, which is held or owned in common by the miners.

The refining-furnace is a mere smithy fire built on a level with the floor, and a hemispherical bowl or basin 8 in. in depth by 12 in. in diameter and 2 in. in thickness is placed on this hearth. A layer of charcoal about 8 in. in thickness is first placed in the cavity of the hearth; on this the bowl filled with charcoal is placed, and on top of this the coarse metal, surrounded and covered by charcoal. The coals are ignited from the bottom, and the blast gradually admitted. When the first lump of coarse metal is in this way melted another lump is added, care being taken to supply the hearth with a proper amount of fuel, and also to keep the bowl filled to the brim with burning coals. The workman takes samples from time to time by means of an iron spoon, and from the appearance of these he is enabled to judge of the working of the furnace and the state of the metal it contains. As soon as the process is found to be sufficiently advanced the blast is stopped, the slags are carefully raked from the surface of the metallic bath, the bowl is removed from the hearth, and its contents poured into sand moulds. In these moulds the copper is shaped into ingots 12" x 3½" x 1½", no further refining is attempted, and the copper is in this condition sent into the market. An ingot of copper, the product of the preceding operation, which I examined was of the quality known in commerce as white metal, and usually contains from 65 to 70 per cent. of copper. A royalty of 25 per cent. of the value of all the copper produced is paid by the miners to the State, and the State also takes over all the copper produced, and pays the miners Rs. 34 for each maund, or in round numbers Rs. 925 per ton. The miners stated that it takes one and a half maunds of charcoal to roast, smelt, and refine one maund of copper ore, and that the average produce of one maund of ore amounted in copper to 7½ lbs., upon which there is a profit of about 1s.

The Chipta Copper Mines, of which there are two, are situated in a series of rolling hills about 4 miles from Dariba; they are said to have yielded good ore in large quantities. They have not been worked for a number of years, and have nearly all fallen together. On one mine a shaft has been sunk to a depth of 40 ft., and from the bottom of this a level had been run off in a southerly direction. About 4 miles from this are the noted iron mines of Bhargurh. They are situated in a high mountain running in a due northerly and southerly direction. The deposit is of very large extent, has been very extensively worked in former years, and as the old workings have all fallen together the ore is at present only extracted from the mere surface of the deposit. Furnaces are erected at Tahla, Ajabgurh, and Kishoree, where the ores from this mine are smelted and refined. The ores consist chiefly of red and brown hematites. As many as 50 different copper mines are said to exist in the vicinity of Judawas, but they are at present one and all abandoned. Many of them are down to water level, and good ores are said in former times to have been extracted. At Kushgurb there is an abandoned iron mine, situated in a high mountain near the town. The deposit consists of rich hematites, and can be traced for a distance of over ½ mile. It has a due northerly course, and has centuries ago been worked to a considerable extent. From here he crossed a small valley to a mountain running parallel with the iron deposit, and here he inspected an abandoned copper mine, said to be of very large extent, and to have been abandoned more than a century ago, on account of the great influx of water. Many shafts of over 50 ft. in depth were pointed out, but after a prolonged and careful search he did not succeed in finding a single specimen of the ores that have been extracted from this mine.

AIX-LA-CHAPELLE TECHNICAL HIGH SCHOOL.—The Calendar for 1884-85 has been issued, and will afford all necessary information to intending students as to the courses to be taken according to the branch of industry to which they intend to devote themselves. The school consists of five departments—architecture, engineering, construction, machine engineering, mining and smelting (including chemistry), and general science. Each department has a full and separate staff of professors, tutors, and assistants, there are several good bursaries, and, altogether, the school possesses all the attractions which the student requiring sound and economic technical instruction need wish for.



## MINING MACHINERY, MILLING MACHINERY

Of the MOST APPROVED AMERICAN PATTERNS.

### GOLD MILLS.

The California pattern of Gold Stamp Mill is universally accepted as the most perfect, economic, and efficient made. We have over 900 stamps in successful work in the various Western Gold Districts.

### SILVER MILLS.

Silver amalgamation in Pans is essentially an American system evolved after years of work on the rich silver mines of Nevada.

We have over 500 Stamps, with necessary pans, settlers, roasting furnaces, &c., all of our own manufacture, at work in different silver camps of the United States, Mexico, and South America, and Phillipine Islands, Asia.

### CONCENTRATION MILLS

Of the most approved German pattern and arrangement, or with Stamps and Frue Vanner Concentrators for low grade silver ores, light in lead. We have over 20 large German pattern mills at work on lead, zinc, or copper ores, and numerous Vanner mills on ores never before successfully concentrated.

Mining Pumps, Cornish pattern, of the largest sizes. Hoisting Engines, from 4 h.p. up to the largest direct-acting engines to sink 3000 feet.

### SMEETING WORKS.

We have 80 Water Jacket Smelting Furnaces in use from 20 in. circular up to 54 in. by 60 in. for lead and silver smelting; and special High Jacket Furnaces for copper ores.

Engines of any size, plain slide valve, Corliss, compound Corliss, Boilers, all sizes. Leaching Mills, Hallidie Wire Rope Tramways, Comet Crusher, with capacity of 12 to 20 tons per hour. White, Howell, Bruckner, and Stetefeldt Roasting Furnaces, &c.

We have had twenty years experience in the manufacture solely of MINING MACHINERY, and have special facilities for shipping to all foreign parts through our New York Office, where all details of clearance, shipment, and insurance are conducted. Our machinery is already well known in Mexico, Peru, Chili, Venezuela, Honduras, and other South American countries.

Correspondence solicited. Descriptive Circulars and Catalogues on application.

### FRASER AND CHALMERS.

PRINCIPAL OFFICE AND WORKS.

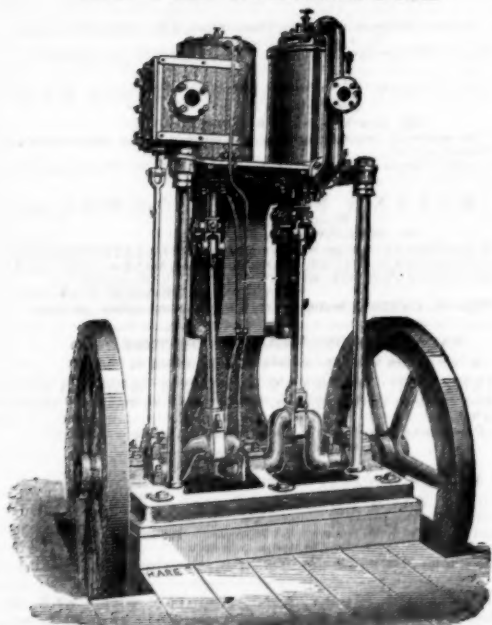
NEW YORK OFFICE.

Fulton and Union Streets,  
Chicago, Ill., U.S.

No. 2, Wall Street,  
New York, U.S.

COLORADO OFFICE—CHEESMAN BLOCK, DENVER.

## THE "Champion" Rock-borer AND AIR COMPRESSOR.



As an instance of the actual work done by this Machinery in various kinds of ground, some of it the hardest rock, it may be mentioned that in Cornwall, irrespective of the work performed by the "Champion" Rock-borers and Air-compressors purchased by various Mines, the drivage, rising, sinking, and stopping done by contract by the Proprietor with his own Machinery now amounts to over 1150 fathoms.

Several of these Air-compressors, ranging from 3½ to 12 tons in weight may be seen in constant work in the Camborne Mining District.

**R. H. HARRIS,**  
ENGINEER,

63, QUEEN VICTORIA STREET, LONDON.

KIRKSTALL, BOWLING, AND STAFFORDSHIRE BAR IRON  
**RAILS—RAILS—RAILS—**

New, slightly defective.

F.B. SECTION—BULL HEAD—DOUBLE HEAD—

10, 12, 14, 16, 18, 20, 24, 30, 40, 50, 60, 70, 75, 80 lb. per yard.

Sections on application to

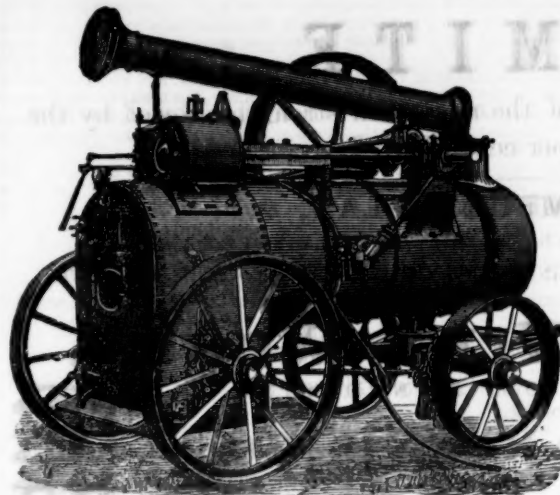
**WILLIAM FIRTH, WATER LANE, LEEDS.**

POINT and CROSSINGS with all Fittings complete.

1070 tons in stock ready for delivery.

## CLAYTON AND SHUTTLEWORTH, STAMP END WORKS, LINCOLN, AND 78, LOMBARD STREET, LONDON.

The Royal Agricultural Society of England have awarded Every First Prize to CLAYTON and SHUTTLEWORTH for Portable and other Steam Engines since 1863, and Prizes at every Meeting at which they have competed since 1849.



GOLD MEDAL AND FIRST CLASS CERTIFICATE at the  
Calcutta International Exhibition 1883-4.  
THE ONLY GOLD MEDAL  
AWARDED FOR  
PORTABLE STEAM ENGINES.

**Steam Engines, portable & fixed,**  
For Coals, Wood, Straw, and every kind of Fuel.

OVER 21,500 SOLD.

**Thrashing Machines.**

OVER 19,500 SOLD.

**Straw, Corn, and Hay Elevators.**

**Chaff Cutters for Steam Power.**

**Grinding Mills.**

**Saw Benches.**

**Traction Engines, &c.**

GOLD MEDALS AND OTHER PRIZES have been awarded to CLAYTON AND SHUTTLEWORTH at all the important International and Colonial Exhibitions, including  
LONDON, 1851 and 1862;  
PARIS, 1855, 1867, and 1878;  
VIENNA, 1857, 1866, and 1873.

Catalogues in English and all European Languages free on application.

## THOMAS TURTON AND SONS,

MANUFACTURERS OF

**Cast Steel for Mining and other Tools, Shear, Blister, and Spring Steel.**  
**FILES OF SUPERIOR QUALITY.**

EDGE TOOLS, HAMMERS, PICKS, AND ALL KINDS OF TOOLS FOR RAILWAYS, COLLIERIES, ENGINEERS, AND CONTRACTORS.  
LOCOMOTIVE ENGINE, RAILWAY CARRIAGE, AND WAGON SPRINGS AND BUFFERS.

**SHEAF WORKS, AND SPRING WORKS, SHEFFIELD.**

LONDON OFFICES:—90, CANNON STREET, E.C.

## POTENTITE.

This unrivalled Explosive, as manufactured by the New and Perfected Machinery of the Company, is perfectly safe for transit, storage, and use, and is employed in every description of Mining or Quarrying Work, for Tunnelling, Pit Sinking, Engineering Work, and Submarine Operations, with the most complete success and satisfaction.

Potentite does NOT contain its own MEANS OF IGNITION, is free from Nitro-Glycerine, and its SAFETY has been specially demonstrated by public experiments.

Its strength is unequalled.

Its action is certain.

In action it gives off neither flame, smoke, nor offensive smell. By its use labour is economised, as work can be resumed immediately after the shot is fired.

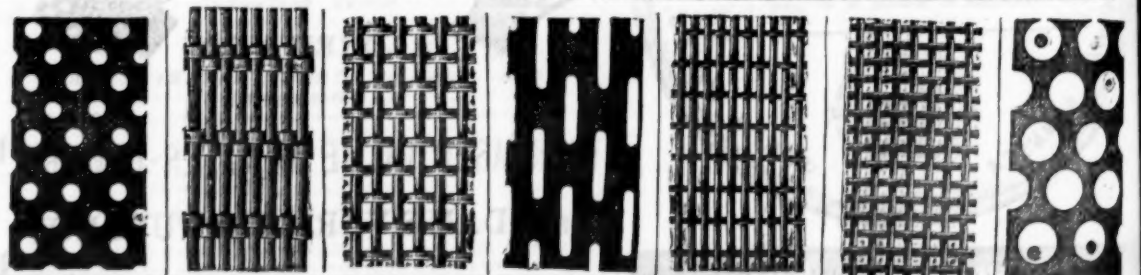
POTENTITE is specially adapted for export to hot climates, as it is unaffected by heat, and is free from dangerous exudations.

POTENTITE IS THE SAFEST STRONGEST, AND WORK FOR WORK, CHEAPEST EXPLOSIVE IN THE MARKET.

For particulars and prices, apply to—

**THE POTENTITE COMPANY, LIMITED.**

HEAD OFFICE—3, FENCHURCH AVENUE, LONDON, E.C.



Extra Treble Strong Wire Cloth and Perforated Metals in Steel, Iron, Copper, Brass, Zinc, Bronze.

Made in all Meshes and Widths.

**N. GREENING & SONS, Limited,**  
Wire Manufacturers and Metal Perforators,  
**WARRINGTON.**

Jigger Bottoms, Trommels, Cylinder Covers, Riddles, Sieves for Diamond, Gold, Silver, Copper, Lead and Tin Mines.

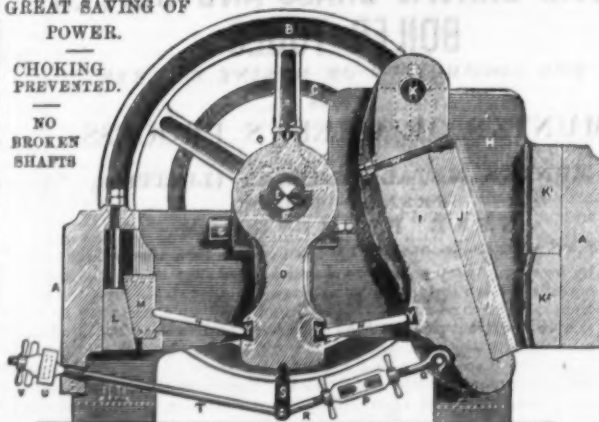
Samples and Prices free on application.

## ROBERT BROADBENT & SON, STALYBRIDGE,

GREAT SAVING OF  
POWER.

CHOKING  
PREVENTED.

NO  
BROKEN  
SHAFTS



PATENTEES AND SOLE MAKERS  
OF THEIR WELL-KNOWN

**Patent Improved  
Blake Stonebreakers  
and Ore Crushers,**

With PATENT DRAW-BACK MOTION,

WHICH DISPENSES WITH ALL SPRINGS.

JAWS adaptable either for CUBING or CRUSHING  
Reversible in Four Sections, with Surfaced Backs.  
Steel Toggle Cushions.

PRICES, PARTICULARS, AND TESTIMONIALS ON  
APPLICATION.



# DEUTSCHE SPRENGSTOFF ACT.-GES.

(GERMAN EXPLOSIVES COMPANY, LIMITED),

HAMBURG.

## DYNAMITE

Of the HIGHEST DESCRIPTION, and of the maximum strength allowed by the British Explosives Act (75 per cent. Nitroglycerine).

HEAD OFFICE: HAMBURG, PLAN, 9.

LONDON AGENT: MR. WM. BRODERSEN, 79, LEADENHALL STREET, E.C.

SHIPMENTS EFFECTED TO ALL PARTS. STOCK KEPT IN LONDON AND NUMEROUS COUNTRY MAGAZINES.

## MANCHESTER WIRE WORKS.

NEAR VICTORIA STATION, MANCHESTER.

(ESTABLISHED 1790).

JOHN STANIAR AND CO.,

Manufacturers by STEAM POWER of all kinds of Wire Web, EXTRA TREBLE STRONG for LEAD AND COPPER MINES.

Jigger Bottoms and Cylinder Covers woven ANY WIDTH, in Iron, Steel, Brass, or Copper.

EXTRA STRONG PERFORATED ZINC AND COPPER RIDDLES AND SIEVES.

PERFORATED IRON, STEEL, COPPER, AND ZINC PLATES IN VARIOUS DIMENSIONS AND THICKNESSES, Shipping Orders Executed with the Greatest Dispatch.



## PATENT WIRE TRAMWAYS

Of all descriptions on the Single and Double-Rope Systems; Self-Acting, and Driven by Steam, Water, or Horse Power.

Carrying from 50 to 1000 tons per day. Over 150 miles erected in all parts of the world. For Particulars and Estimates apply to

W. T. H. CARRINGTON, 9, and 11, Fenchurch Avenue, London,

Removed from 76, Cheapside, E.C.

ENGINEER AND MANAGER TO THE OWNERS OF THE PATENTS FOR WIRE ROPE TRANSPORT.



## FELTEN & GUILLEAUME,

MANUFACTURERS OF

IRON AND STEEL WIRE, Round and Flat Wire Ropes,

OF ALL DESCRIPTIONS FOR MINING, INCLINES, SHIPS' RIGGING, TOWING, HAWSERS, &amp;c.

W. F. DENNIS AND CO., (Sole Agents for Great Britain),

101, LEADENHALL STREET, LONDON, E.C.;

MIDLAND BUILDINGS, 1, NEW STREET, BIRMINGHAM; AND 3 TOWER CHAMBERS, WATER STREET, LIVERPOOL.

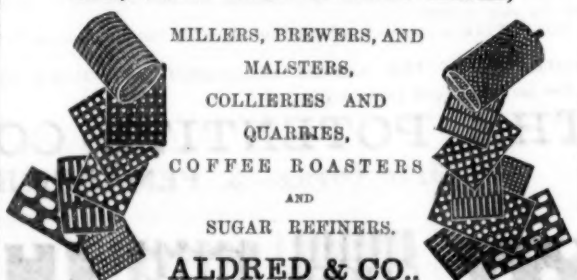
Messrs. FELTEN AND GUILLEAUME

MANUFACTURE MINING AND OTHER ROPES with the wire forming the strands laid either to the right or left hand, and the strands forming the rope laid in the opposite direction, or having the strands laid up into the rope same way as the wire in the strand as the customer may prefer. Ropes of the latter construction have been recently patented; but Messrs. FELTEN and GUILLEAUME, having manufactured ropes on this system for upwards of 40 years, are prepared to supply such ropes, and guarantee the purchaser against any liability for infringement of the patent referred to.

## PERFORATED SHEET METALS

FOR

TIN, LEAD AND COPPER MINES,



MILLERS, BREWERS, AND  
MALSTERS,  
COLLIERIES AND  
QUARRIES,  
COFFEE ROASTERS  
AND  
SUGAR REFINERS.

ALDRED &amp; CO.,

WORKS: PARKER STREET, ASHLEY LANE, MANCHESTER

## INCREASED VALUE OF WATER-POWER.

### MacADAM'S VARIABLE TURBINE.

This Wheel (which is now largely in use in England, Scotland, and Ireland) is the only one yet invented which gives proportionate power from both large and small quantities of water. It can be made for using a large winter supply, and yet work with equal efficiency through all variations of quantity down to a fifth, or even less if required. It is easily coupled to a steam-engine, and in this way always assists it by whatever amount of power the water is capable of giving, and therefore saves so much fuel.

This Turbine is applicable to all heights of fall. It works immersed in the tail-water, so that no part of the fall is lost, and the motion of the Wheel is not affected by floods or back-water.

These Turbines are at work in nearly every county in England. Apply to—

MacADAM BROTHERS AND CO., BELFAST.

## SOLID DRAWN BRASS AND COPPER BOILER TUBES

FOR LOCOMOTIVE OR MARINE BOILERS

EITHER

MUNTZ'S OR GREEN'S PROCESS

MUNTZ'S METAL COMPANY (LIMITED),  
FRENCH WALLS,  
NEAR BIRMINGHAM.

LONDON AGENTS—CHARLES MOSS AND CO., 2, ROAD LANE, LONDON, E.C.

J. S. MERRY,

ASSAYER AND ANALYTICAL CHEMIST,

SWANSEA,

SUPPLIES ASSAY OFFICE REQUIREMENTS AND RE-AGENTS.

W. F. STANLEY

MATHEMATICAL INSTRUMENT MANUFACTURER to H.M. GOVERNMENT, COUNCIL OF INDIA, SCIENCE AND ART DEPARTMENT, ADMIRALTY, &c.

MATHEMATICAL, DRAWING and SURVEYING INSTRUMENTS of every description, of the highest quality and finish, at the most moderate prices.

Price List post free.

ENGINE DIVIDER TO THE TRADE.

ADDRESS—GREAT TURNSTILE, HOLBORN, LONDON, W.C.

## RAILS—STEEL AND IRON.

NEW, PERFECT, and SLIGHTLY DEFECTIVE. Suitable for Colliery Sidings and Contractors' purposes. Large and assorted stocks.—Apply for Sheet of Sections to

BOLLING AND LOWE,

2, LAURENCE POUNTNEY HILL, LONDON, E.C.

## CALIFORNIAN AND EUROPEAN AGENCY.

509, MONTGOMERY STREET, SAN FRANCISCO CAL.

J. JACKSON, Manager.

SILVER MEDALS AWARDED AT CORNWALL POLYTECHNIC 1872 AND 1876.

THE WELL-KNOWN PATENT SELF-ACTING ORE DRESSING MACHINERY, as in operation at most of the large Mines in the Kingdom and Abroad, is now supplied solely by THE PATENTEE AND MANUFACTURER, Mr. GEORGE GREEN, Mining Engineer, AT GREATLY REDUCED PRICES also all descriptions of Mining Machinery, including GOLD AND SILVER AMALGAMATING MACHINERY, complete Stamp Mills, Water Wheels, Steam Engines, &c.

ROLLER SHELLS FOR CRUSHING MILLS—a speciality.

SPECIAL DESIGNS FOR EXPORT AND DIFFICULT TRANSIT.

Prices and particulars on application to the Manufactory, ABERYSTWTH, SOUTH WALES.

Now ready, price 25s., post free.

## COMPOUND DIVISION COST SHEET READY RECKONER.

Designed for effecting in minutes what has hitherto taken hours to accomplish.

For use in making out Cost Sheets of Collieries, Ironstone and other Mines, Iron, Gas, and Water Works, Quarries, and Manufactories generally. For Accountants, Merchants, Public, and Private Offices.

By WILLIAM WETHERED.

This work is applicable to calculations where any number of articles cost is given sum, and the price of one of such number is required.

The circulation of such a book as this must necessarily be limited. It is doubtful whether it will pay more than the bare cost of publishing, allowing nothing for the enormous amount of labour such a mass of figures has occasioned. The price cannot be named at less than 25s., and it is not too much to say that where it can be applied its cost will be saved in a few weeks. It will be found invaluable to accountants generally.

Copies can now be had, and will be forwarded from the MINING JOURNAL Office on receipt of Post Office Order for the amount.

Just published.

THE NORTH WALES COAL FIELDS. Being a series of Diagrams showing the Depth, Thickness, and Local Names of the Seams in the principal Collieries of the various districts, with Index, Geological Map, and horizontal sections across the Ruabon, Brynbo, Buckley, and Mostyn districts.

By JOHN BATES GREGORY and JESSE PRICE,

of Hope Station, near Mold, Flintshire.

Price: Mounted on holland, coloured and varnished, and fixed on mahogany rollers, 30s. each; or in book form, 12x9, mounted and coloured, 25s. each.

May be obtained, by order, of all Booksellers, or direct from the MINING JOURNAL Office, 26, Fleet-street, London, E.C., upon remittance of Post Office Order for the amount.

Just published, price 7s. 6d., post free.

## TABLES FOR ASCERTAINING THE PRICE OF TIN ORE AT A GIVEN STANDARD AND PRODUCE.

To which is added Tables for Ascertaining the Value of any Quantity of Black Tin, from 1 lb. to 10 tons, at any price from £20 to £100 per ton. Originally compiled and calculated by the late Mr. R. WELLINGTON; and now extended, reprinted by Mr. W. BAILEY, of Camborne, and carefully verified throughout.

London: MINING JOURNAL Office, 26, Fleet-street, E.C.; and may be had by order of all Booksellers.

Australia: GEORGE ROBERTSON, Melbourne, Sydney, Adelaide, and Brisbane.

## THE COLLIERY READY-RECKONER AND WAGES CALCULATOR.

By JAMES IRELAND

"Will be the means of preventing many disputes between pay clerks and colliers."—Mining Journal.

To be had on application at the MINING JOURNAL Office, 26, Fleet-street, E.C.

## THE MINING RECORD, Only \$5.00 a year.

Foreign Postage.

61, BROADWAY, NEW YORK.

the ONLY PAPER in the United States that gives FULL LATEST ACCOUNT from all the GREAT GOLD, SILVER, IRON, and COAL MINES of AMERICA.

ORDERS EXECUTED FOR MINING STOCKS. Information free.

London Office—H. CARTER, Manager, 36, King William-street, London.

HALF-PRICE—ONE SHILLING POST FREE.

A few copies with the covers slightly soiled of the

## ENGLISH AND FOREIGN MINING GLOSSARY:

To which is added the SMELTING TERMS used in FRANCE, SPAIN, and GERMANY.

London: Published at the MINING JOURNAL Office, 26, Fleet street, E.C.; and all Booksellers.

SMALL ENOUGH TO CARRY IN THE POCKET ANEROID CASE.

PRACTICAL HYPSONOMETRY: A Method of DETERMINING ALTITUDES (Heights of Mountains and Depths of Mines) accurately and almost instantaneously, with the Aneroid Barometer, WITHOUT TABLES.

Price One Shilling, post free

London: MINING JOURNAL Office, 26, Fleet-street, E.C.

MONEY LENT, at EIGHT, NINE, and TEN PER CENT., on FIRST MORTGAGE OF FREEHOLDS for IMPROVEMENTS and STOCKING, said freeholds in the Province of MANITOBA.

Address, HERBERT C. JONES, Solicitor, 20, Masonic Hall, Toronto

MR. P. S. HAMILTON (late Chief Commissioner of Mines for the Province of Nova Scotia), PRACTICAL GEOLOGIST, MINING AGENT, and MINING ENGINEER, HALIFAX, NOVA SCOTIA.

PURCHASES and SALES of MINING PROPERTY effected, with careful regard to the interests of clients.

ESTABLISHED FIFTY YEARS.

## THE MINING JOURNAL, RAILWAY AND COMMERCIAL GAZETTE

Has the

WIDEST CIRCULATION

Amongst

MINERS METALLURGISTS, ENGINEERS,

And all

FINANCIAL AND COMMERCIAL MEN THROUGHOUT THE GLOBE.

PRICE SIXPENCE WEEKLY.

SUBSCRIPTION:

Great Britain ..... £1 4 0 per annum.  
Postal Union ..... 1 8 0 "

LONDON:

MINING JOURNAL OFFICE, 26, FLEET STREET AND TO BE HAD OF ALL BOOKSELLERS AND NEWSAGENTS.



## THE BLAKE-MARSDEN NEW PATENT IMPROVED STONE BREAKERS AND ORE CRUSHERS.

ORIGINAL PATENTEE  
AND ONLY MAKER.ALSO PATENTEE AND ONLY  
MAKER OF THE**H. R. MARSDEN,**  
**NEW PATENT FINE CRUSHER OR PULVERIZER**

FOR REDUCING TO AN IMPALPABLE POWDER, OR ANY DEGREE OF FINENESS REQUIRED,

**GOLD QUARTZ, SILVER, COPPER, TIN, ZINC, LEAD**

AND ORES OF EVERY DESCRIPTION

PATENT REVERSIBLE CUBING AND CRUSHING  
JAWS, IN FOUR SECTIONS,WITH PATENT FACED BACKS, REQUIRING  
NO WHITE METAL IN FIXING.CRUCIBLE CAST-STEEL CONNECTING RODS.  
RENEWABLE TOGGLE CUSHIONS, &c.**OVER 4000 IN USE.**EXTRACTS FROM TESTIMONIALS.  
PULVERIZER.

"I have great pleasure in bearing testimony to the merits and capabilities of your patent combined fine crusher and sieving apparatus. I have tried it on a variety of ores and minerals, and it pulverizes them with equal success. You can put in a small paving stone and bring it out like flour."

"In reply to your favour, I have much pleasure in informing you that the 12x3 Pulverizer we had from you is giving us every satisfaction. The material we are operating on is an exceptionally hard one. I am well satisfied with its working."

"Our experience is that the motion and mechanical arrangements of your machine are the best for pulverizing that we have ever met with."

"The reports from our mines as regards the working of your Fine Crusher (20x5) recently supplied are very favourable, although we cannot quote you exact figures. On being got into position it was tried by hand, with the result that it made short work of the biggest pieces of ore we put into the hopper. You might say how long you would take to deliver another of the same size."

"As I once before stated, your machine is a perfect pulverizer. I am sure the machine will be a success, and a great one, and there is any amount of demand for such a machine. We can work it with 20 lbs. of steam, and our engine, which is a 12-h.p., plays with the work, in fact we run the Stonebreaker and the Pulverizer both together with 35 lbs."

Also Cement, Barytes, Limestone, Chalk, Pyrites, Coprolite, &c., &c. These Machines are in successful operation in this country and abroad, and reference to users can be had on application.

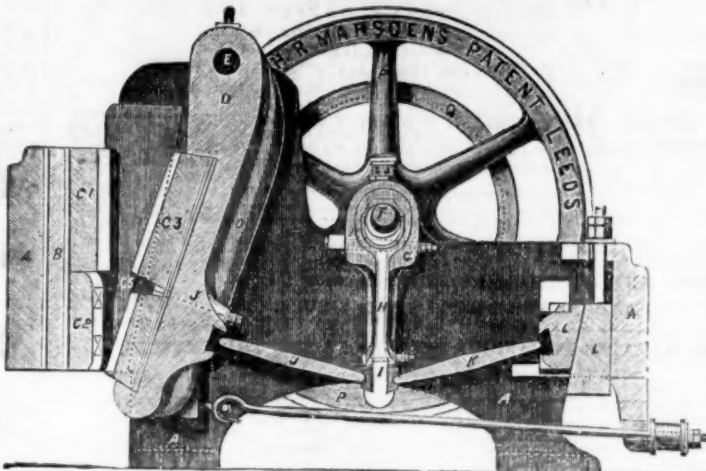
AWARDED OVER

**60**

FIRST-CLASS GOLD AND SILVER MEDALS

ADOPTED BY THE PRINCIPAL CORPORATION  
TRACTORS, MINING COMPANIES, &c., IN  
PARTS OF THE WORLD.ROAD METAL BROKEN EQUAL TO HAND  
ONE-TENTH THE COST.

EXTRACTS FROM TESTIMONIALS.—STONEBREAKER  
"I now order Three of your Stone Crushers, size 15 x 10, your very best construction, and to include two extra sets and Cheeks for each. The last two 24x13 machines you which are at work in this colony, are doing very well, soon find that the railway contractors will adopt your machine preference to the colonial ones—two of which I have. I know contractors have had as many as nine of them, which have very good satisfaction. Once they know of yours they believe you will do a good trade with the colonies. For the high character of your constructions you can refer to having used them with the very best results, both in New and this colony, and much prefer them to the colonial article in point of construction and less liability to go out of order material we are crushing is very hard blue stone, for railway purposes. Push on with the order as quickly as possible. I think it necessary to have any engineering inspection, brought your machines prominently under the notice of contractors in this colony, likewise the Government. Many contractors have spoken to me in reference to their capabilities I could only tell them that they are by far and away the most economical I ever used. The very fact of me having now Eleven from you at various intervals and various sizes, above 12 years ago, and having tried all the other makers, is a guarantee of the capabilities and the working of your machines in every way surpass all others."  
"Some of your testimonials do not give your machines due. I have seen men hammering away on a big rock for a of a day which your machine would reduce to the required quarter of a minute. I would guarantee that your largest chine would reduce more of the Cornish tin capels (the hardest rock of England) in a day than 200 men, and at a cost."



GREATLY REDUCED PRICES ON APPLICATION.

FOR CATALOGUES, TESTIMONIALS, &c., APPLY TO THE SOLE MAKER,  
**H. R. MARSDEN, SOHO FOUNDRY, LEEDS.****JOHN CAMERON'S**

FLY-WHEELS ON BOTH SIDES.

SPECIALITIES ARE HIS

**STEAM PUMPS**  
FOR  
**COLLIERY PURPOSES.**

Specially adapted for forcing Water any height

ALSO, FOR

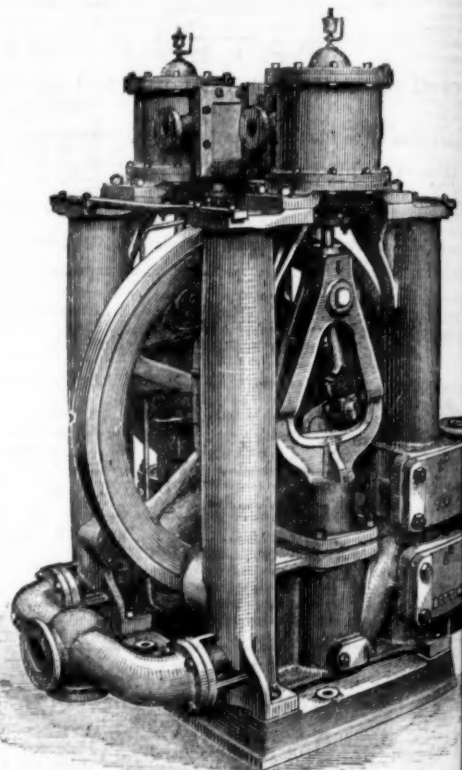
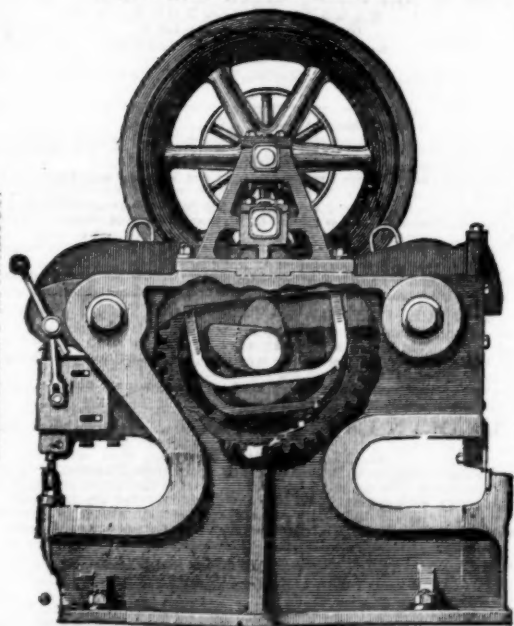
**SINKING, FEEDING BOILERS AND STEAM  
FIRE ENGINES,**

Of which he has made over 9000.

ALSO, HIS

**PATENT CAM AND LEVER  
PUNCHING & SHEARING MACHINES.****Works: Oldfield Road, Salford,  
Manchester.**AGENTS { For LONDON and DISTRICT—PRICE and BELSHAM,  
52, QUEEN VICTORIA STREET, E.C.  
For NEWCASTLE and EAST COAST—E. BECKWITH AND CO.,  
BONNERSFIELD, SUNDERLAND.

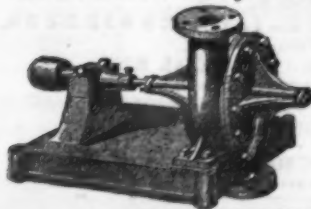
DISENGAGING APPARATUS.



By a special method of preparation this leather is made solid, perfectly close in texture, and impermeable to water; it has, therefore, all the qualifications essential for pump buckets, and is the most durable material of which they can be made. It may be had of all dealers in leather, and of—

**HEPBURN AND GALE, LIMITED,**  
TANNERS AND CURRIERS,  
LEATHER MILL BAND AND HOSE PIPE MANUFACTURERS,  
LONG LANE, SOUTHWARK, LONDON.  
Prize Medals, 1851, 1855, 1878, for  
MILL BANDS, HOSE, AND LEATHER FOR MACHINERY PURPOSES.

"THE PATENT ACCESSIBLE"

**CENTRIFUGAL PUMP**Is the only Pump from which the disc can be removed by  
breaking the joint on a single face only.Manufactured by **CHARLES L. HETT,**  
HYDRAULIC ENGINEER,

Maker of  
IMPROVED CENTRE VENT  
TURBIN  
WATER WHEELS,  
Horse, Steam and Wind Power  
PUMP

Catalogues on Application.

**ANCHOLME FOUNDRY, BRIGG,  
ENGLAND.**

ESTABLISHED 1825.

**EDWIN LEWIS AND SONS,**  
Patent Tube Works, MONMORE GREEN and Britannia Boiler Tube Works, ETTINGSHA  
**WOLVERHAMPTON.**

MANUFACTURERS OF

**Lapwelded & Buttwelded Wrought-iron, Steel, or Homogeneous Tube**  
FOR EVERY  
**COLLIERY OR MINING PURPOSE.****J. WOOD ASTON AND CO., STOURBRIDGE**

(WORKS AND OFFICES ADJOINING CRADLEY STATION),

Manufacturers of

**CRANE, INCLINE, AND PIT CHAINS**Also CHAIN CABLES, ANCHORS, and RIGGING CHAINS, IRON and STEEL SHOVELS, SP  
FORKS, ANVILS, VICES, SCYTHES, HAY and CHAFF KNIVES, PICKS, HAMMERS, NAIL  
RAILWAY and MINING TOOLS, FRYING PANS, BOWLS, LADLES, &c., &c.

Crab Winches, Pulley and Snatch Blocks, Screw and Lifting Jacks, Ship Knees, Forgings, and Use Iron of all descriptions

**WELDED STEEL CHAINS**FOR CRANES, INCLINES, MINES, &c.,  
MADE ALL SIZES.